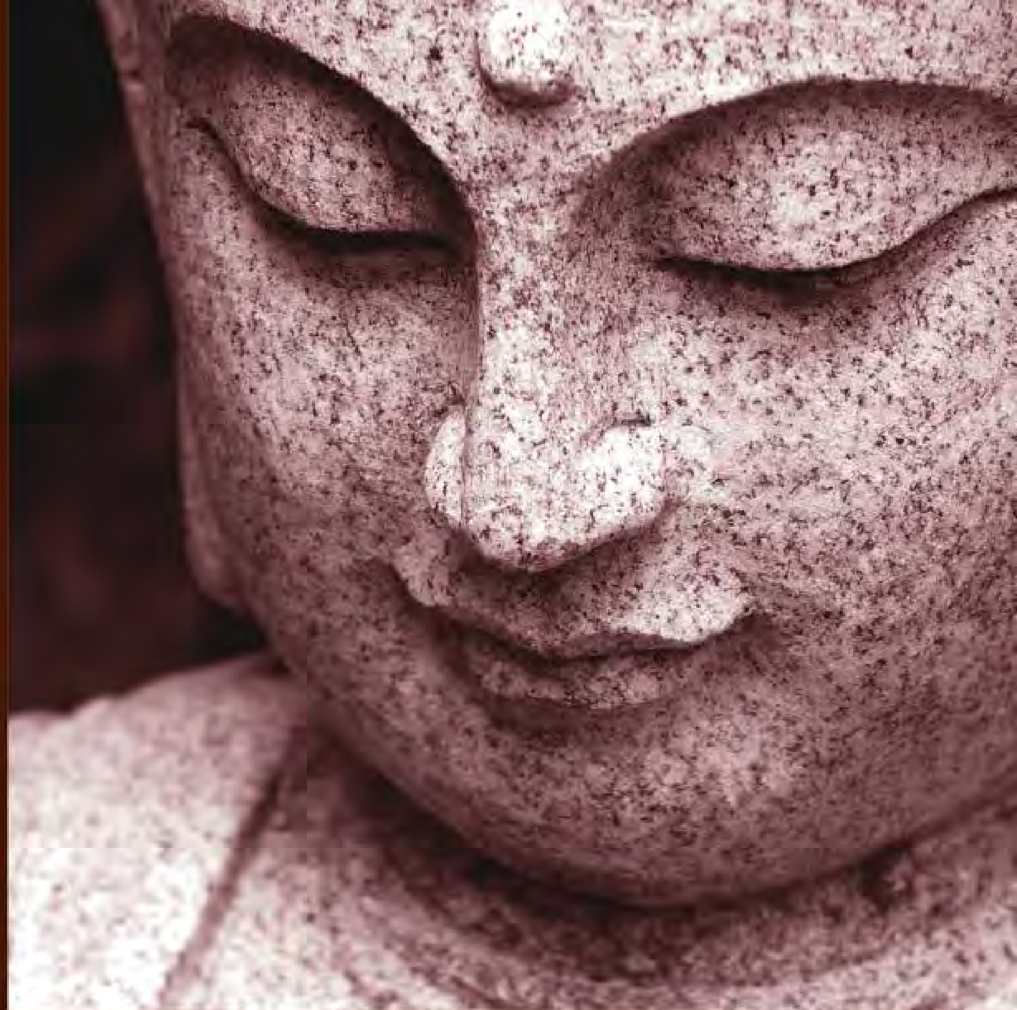


Paul D. Numrich (ed.)

The Boundaries of Knowledge in Buddhism, Christianity, and Science

Vandenhoeck & Ruprecht

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Table of Contents

Preface

Several years ago I read an article in a respected popular magazine summarizing contemporary science-religion dialogue. I recognized the Christian contours of the article and wondered, How might this article – and contemporary science-religion dialogue – be different if Buddhist insights were considered? This simple question led to a funded project, a public conference, and the present collection of essays by a distinguished group of scholars (see Numrich: this volume).

This volume brings together insights from religion (represented by Buddhism and Christianity) and science to address the deepest questions about reality and knowledge – not the usual offering in contemporary science-religion dialogue. In the opening chapter, I ruminate on the boundaries and limits of human knowledge, focusing especially on the inadequacies of conceptualization and language in understanding reality, as recognized by both science and religion. The other chapters move largely from Buddhism to Christianity to science, although several incorporate insights from more than one of these worldviews. Trinh Xuan Thuan (Chapter 2) discusses the complementarity of the domains of knowledge in science and Buddhism. David L. McMahan (Chapter 3) explores Buddhist discourses about science in the modern period, while Dennis Hirota (Chapter 4) compares the views of the medieval patriarch of Pure Land Buddhism, Shinran, and the modern Western philosopher Martin Heidegger. Mark T. Unno (Chapter 5) and Paul O. Ingram (Chapter 6) range across the three worldviews, while Gordon D. Kaufman (Chapter 7), Antje Jackelén (Chapter 8), and Tom Christenson (Chapter 9) focus on Christian theological perspectives. John R. Albright (Chapter 10) concludes the volume with a discussion of scientific knowledge.

My deepest gratitude goes to the John Templeton Foundation for funding the project that eventuated in this volume. For their aid and encouragement, the following individuals deserve special recognition: Paul K. Wason, Director of Science and Religion Programs; Andrew Rick-Miller, Program Officer; Patricia B. Franklin, Program Associate; and Patrick Brennan, Grants Program Associate. Kimon Sargeant at the Metanexus Institute first encouraged me to propose this project to the Templeton Foundation, for which I am very grateful.

The project's advisory group brought together four experts on Buddhism, Christianity, and science: Roger Blomquist, Nuclear Engineer, Argonne National Laboratory; Thomas Kasulis, Professor of Japanese Re-

ligions and Asian and Western Philosophies, The Ohio State University; Donald Luck, T. A. Kantonen Professor of Theology (Emeritus), Trinity Lutheran Seminary; and George Murphy, adjunct faculty in Science-Theology Dialogue and Systematic Theology, Trinity Lutheran Seminary. In addition to these formal advisors, Robert W. Numrich, Senior Research Associate at the Supercomputing Institute for Digital Simulation and Advanced Computation, served as unofficial gadfly to the project. These individuals helpfully critiqued drafts of the chapters in this volume. As editor I take responsibility for the volume's shortcomings, but I cannot take full credit for its accomplishments – these stem from the remarkable insights and collegiality of all involved.

Several individuals at the Theological Consortium of Greater Columbus made this volume possible in a variety of ways. The deans of the Consortium seminaries supported the larger project as they have all of my programmatic efforts: Don Huber of Trinity Lutheran Seminary, John Kampen of Methodist Theological School in Ohio, and Michael Ross of Pontifical College Josephinum. My student assistants, Brian Dickensheets (Methodist Theological School) and Monica Pierce (Trinity Lutheran Seminary), performed ably and greatly eased my load. The following administrators and staff deserve grateful recognition for the services they provided the project: from Methodist Theological School, Colleen Perry Keith, Executive Vice President; Jere T. Schrader, Assistant Controller; and Diane Kensinger, Accounting Services; from Trinity Lutheran Seminary, Margaret L. Farnham, Director of Communications; and Nona Jensen, Faculty Secretary. I must not forget the students in my classes who showed interest in the project even in contexts unrelated to the topic of contemporary science-religion dialogue.

Two organizations helped to publicize the project: the Society for Buddhist-Christian Studies and the Ohio Council of Churches. My special thanks to Harry Wells and Rebecca Tollefson, respectively.

The fine people at Vandenhoeck and Ruprecht deserve much credit for producing this volume, especially Tina Bruns, Editor, Theology and Religion.

As always, my wife Christine commands the most appreciation. We have shared a long and winding road since East High School.

One technical aspect of the volume deserves brief comment. We do not include diacritical marks in non-English words and names, with the exception of the German umlaut. Instead, we use the nearest equivalent letter for the diacritic.

April 2008 *Paul D. Numrich*

Chapter 1
Reality and Knowledge

Paul D. Numrich[1]

1 The Biggest Questions

One of the textbooks I assigned in an introductory philosophy course some years ago was entitled *The Big Questions* (Solomon: [4]1994). To my mind, one of the biggest questions is, What is reality, or what is "real"? Philosophy is not the only branch of human endeavor that weighs in on this question. Science and religion also aspire to understand reality.

The present volume addresses the equally big (and related) question, What can we know about reality or what is "real"? Thus, this volume has an epistemological agenda in bringing together insights from religion (represented by Buddhism and Christianity) and science. Rather than offering formulaic treatments about how religions might accommodate the latest scientific discoveries or engaging in narrowly construed theoretical and doctrinal discussions, this volume inquires into profound epistemological issues that cut across these worldviews. How do Buddhism, Christianity, and science explore the boundaries between the known and the unknown? What do they define as unknowable? How do they participate in the human quest for knowledge about reality? This volume goes beyond the usual fare in contemporary science-religion dialogue. Here science and religion engage each other's attempts to understand reality.

The project that produced this volume did not begin with this in mind. In 2005, the John Templeton Foundation awarded me a grant for a project entitled Comparative Religious Perspectives on Science: Buddhism and Christianity. My intention was to widen religious representation and challenge common assumptions in contemporary science-religion dialogue, which has been dominated by Christianity on the religion side. For instance, in his discussion of cosmology, Christian theologian and physicist Robert John Russell (2000, 30) resolves the question of why anything exists, as opposed to nothing, by saying, "The answer is 'God'." In *Creative Tension: Essays on Science and Religion*, cosmologist, Catholic priest, and

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[1] My thanks to George Murphy and Robert W. Numrich for their astute critiques of a draft of this chapter. Neither is culpable for remaining shortcomings.

Templeton Prize recipient Michael Heller (2003, chapter 4) offers "A Program for Theology of Science" based on what he considers self-evident theological propositions regarding the universe, namely, that it was created by God, that its existence is entirely dependent or contingent upon its Creator God, and that it contains inherent values bestowed by God. Christian apologetics is a major motivation for much contemporary science-religion dialogue, as seen in *Belief in God in an Age of Science*, one of many books by physicist, Anglican priest, and Templeton Prize recipient John Polkinghorne (1998). Polkinghorne defends traditional Christian doctrines in light of recent scientific theories, engaging in an "apologetic exercise [of] trying to make the faith appear acceptable in a scientific age" and pursuing an "exploration of Christian truth" (85). To the question posed by the title of one of the book's chapters, "Does God Act in the Physical World?", Polkinghorne answers, Yes, because contemporary science "allows us to conceive of the Creator's continuing providential activity and costly loving care for creation" (75). Clearly, Christian notions of "God" provide the motivation, presuppositions, and conclusions for many, if not most, contemporary discussions about science and religion.

My initial intention for the project was simply to bring Buddhist voices to the dialogue table. I was not alone in recognizing the importance of this. As James F. Moore, director of the Interfaith Project at the Zygon Center for Religion and Science, has written, "Many of us believe that any productive dialogue between religion and science must expand to include the whole range of religions." (2002, 37). Polkinghorne (e.g. 1996; 1998), for one, has considered the alternative perspectives of non-Christian religions. To paraphrase a dictum of the scholarly discipline of comparative religion, "To know only one religion is to know none." To understand fully what "religion" brings to the table, science-religion dialogue must consider more than one kind of religious worldview (cf. Hirota, Ingram, Thuan, and Unno: all this volume).

Buddhism provides a worthy case study in comparative religious perspectives because it does not belong to the theistic family of religions that includes Christianity. Bringing Buddhist scholars and philosophers into conversation with their Christian counterparts challenges currently privileged perspectives and provides a broader understanding of what religion has to say about science. For example, Buddhism rejects Western theological assumptions about a providential Creator God who infuses creation with divine values. Buddhists agree about the importance of values but do not see them as deriving from a Creator. To take another example, cosmological debates cannot be cast in the usual theism-versus-materialism framework when Buddhist non-theism is taken seriously.

As important as all this is, the project took an early epistemological turn, to use Mark Unno's phrase (this volume). The project's advisors recom-

mended that we not devolve into a simplistic litany of how the latest scientific theories confirm the ancient wisdom of religion. Rather, we should focus on the question of "knowability" in science and religion. Further, we should challenge the hubris that claims to know everything – or everything that really matters – whether that hubris claims to speak for science or for religion.

The seventeenth-century mathematician and philosopher Blaise Pascal pondered the human being's place in nature. His profound insights capture the human condition, suspended between transcendence both behind and ahead:

> For, in fact, what is man in nature? A Nothing in comparison with the Infinite, an All in comparison with the Nothing, a mean between nothing and everything. Since he is infinitely removed from comprehending the extremes, the end of things and their beginning are hopelessly hidden from him in an impenetrable secret; he is equally incapable of seeing the Nothing from which he was made, and the Infinite in which he is swallowed up … .
>
> Let us then take our compass; we are something, and we are not everything. The nature of our existence hides from us the knowledge of first beginnings which are born of the Nothing; and the littleness of our being conceals from us the sight of the Infinite.
>
> Our intellect holds the same position in the world of thought as our body occupies in the expanse of nature. (Trotter: 1941, 23 ff [*Pensees* 72]).

This was not cause for despair to Pascal, for although human beings are vulnerable reeds, as he writes in another place (*Pensees* 347), we are thinking reeds. In an exquisite existential irony, humans can ponder the limitations of their own pondering. Pascal moves from initial trepidation to humble contemplation of the human condition:

> Let him lose himself in wonders as amazing in their littleness as the others in their vastness … . He who regards himself in this light will be afraid of himself, and observing himself sustained in the body given him by nature between those two abysses of the Infinite and Nothing, will tremble at the sight of these marvels; and I think that, as his curiosity changes into admiration, he will be more disposed to contemplate them in silence than to examine them with presumption. (Trotter: 1941, 23 [*Pensees* 72]).

2 *The Boundaries and Limits of Knowledge*

Boundaries are movable. The frontiers of knowledge are often pushed back in both science and religion. Yet these shifting boundaries exist within larger fixed limits of human knowability. What Buddhists, Christians, and scientists do in the face of moveable boundaries within fixed limits of knowability provides the intrigue of this volume. The contributors to this volume

were not required to make a distinction between (moveable) boundaries and (fixed) limits. At times these terms are used interchangeably, at other times the distinction is implicitly called into question, thus adding to the intrigue of this volume.[2]

In the present chapter, we will consider Buddhism, Christianity, and science as case studies in the human endeavor to understand a reality tantalizingly beyond our ability to understand fully. Here we examine the epistemological conundrums at the boundaries and limits of human knowledge, where at some point both conceptualization and language inevitably fail us.

2.1 *The Boundaries and Limits of Knowledge in Buddhism*

In a memorable encounter recorded in a classical Buddhist text, The Questions of Malunkya-putta, one of the Buddha's disciples expresses disappointment that the Buddha had not answered some questions he deemed very important, including whether the world is eternal or not, whether it is finite or infinite, and whether a Buddha, an Enlightened One, exists after death or not. The Buddha sidesteps these questions, deeming them irrelevant to the ultimate religious goal of liberation from the human condition.

Such texts have provided fertile ground for Buddhist commentaries and discussions about the knowledge of the historical Buddha (ca. 500 BCE) and others who attain enlightenment or Nirvana. As David L. McMahan (this volume) notes, pre-modern Buddhist epistemology comprised a range of positions that included claims about a Buddha's omniscience. According to some, the historical Buddha knew the answers to the questions posed by his disciple – and to all possible questions, given his omni-science or all-knowledge – but chose not to divulge them as part of his skilful teaching.

Claims about enlightened omniscience appear hubristic, given the assumption that human beings are incapable of knowing everything. Such claims can be demythologized of their pre-modern framework in order to bring them into conversation with modern presuppositions, as some contemporary Buddhist interpreters have done, although McMahan correctly points out that modernist interpretations often inflict ideological damage on the cultural contexts of both pre-modern Buddhism and the lived religion of many Buddhists today. A modernist interpretation would classify claims about a Buddha's omniscience as ancient mythology, comparable to

[2] My thanks to Roger Blomquist for the distinction between boundaries and limits. A "limit," he suggests, represents "what is unknowable, i.e. the ultimate boundary" (personal communication).

claims about the supra-normal abilities of other religious figures from the pre-modern era.[3]

In discussing the views of the Zen Buddhist modernist D.T. Suzuki on the experience of oneness with nature that comes with enlightenment, McMahan suggests that Suzuki probably did not mean that one would thereby know the number of grains of sand in the Ganges River. Buddhism's traditional distinction between conventional truth and ultimate truth pertains here. The domain of (conventional) scientific knowledge is phenomenal reality that is accessible through empirical investigation, while the domain of (ultimate) spiritual knowledge is a reality that is not accessible through empirical investigation. As Trinh Xuan Thuan (this volume) explains, the two domains (or magisteria) of science and Buddhism are complementary and overlapping – contra the palaeontologist Stephen Jay Gould's assertion that science and religion are "non-overlapping magisteria" – in that they share some consonant perspectives. Even so, the distinction is crucial in pointing up religion's (including Buddhism's) fundamental perspective on reality: A transcendent reality bestows ultimate meaning upon material reality, a claim that science can neither confirm nor falsify given its empirical methods of investigation.[4]

"The problem at stake here," writes Michael Heller of the domain of knowledge of science, "is the problem of limits. We should notice, however, that the limits in question are defined 'from the side of the sciences,' that is, by approaching them from within the domain controlled by the sciences. The other side remains inaccessible for the scientific method." (2003, 29). Some years ago Carl Sagan asked the Dalai Lama what Buddhism would do if science disproved the notion of multiple lifetimes. The Dalai Lama responded that Buddhism would have to abandon the belief, adding immediately: "But it's going to be mighty hard to disprove reincarnation" (Obst: 1996; cf. Thuan: this volume). Translation: Buddhism asserts that such knowledge cannot be disproved by science.

The notion of "the other side," Heller's phrase above, is familiar to Buddhism, as Nirvana is often identified metaphorically as the other or further shore of the river, the near shore being the territory of conventional knowledge where most people dwell. "Few people cross to the further shore; the others simply run around the bank on this side," said the Buddha (Dham-

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[3] The method of demythologizing pre-modern religious texts and beliefs was proposed by the Christian theologian Rudolf Bultmann (1957) but has been widely employed by religion scholars and modernist interpreters of religion.

[4] The two-domains understanding of the relation between Buddhism and science has been discussed by contemporary Buddhist authors, sometimes to counter unsophisticated assertions about Buddhism being the quintessentially "scientific" religion (e.g. Rahula: 1983; Dhammananda: 1987). Variations of the two-domains approach are common beyond Buddhist circles (Barbour: 1997, 84–89).

mapada 85; translation by the author). Moreover, those who have been to the other side cannot explain it to those who have not and those who have not been to the other side cannot fathom such an experience. In another well-known Buddhist metaphor, a tortoise cannot explain dry land to a fish who knows only water, for the fish has no conceptual framework for understanding what the tortoise has experienced outside of the water.

The idea of Nirvana, or *Sunyata* (Sanskrit, Emptiness) in the Mahayana tradition, epitomizes the Buddhist view of the limits of conventional knowledge, and especially the limits of language, for it "is too poor to express the real nature of the Absolute Truth or Ultimate Reality which is Nirvana" (Rahula: [2]1974, 35). Nirvana/Truth/Reality eludes discursive, propositional, and calculative thinking (Hirota and Unno: both this volume). Thus, it is often expressed *via negativa*, with negative appellations, given that it is not like anything we know in ordinary reality, though this does not imply that it is a negative state – it transcends all dualities like positive/negative. Nirvana "is the untranslatable expression of the Unspeakable, of that for which in the Buddha's own saying there *is* no word, which cannot be grasped in terms of reasoning and cool logic, the Nameless, Undefinable ..." (Davids and Stede: 1986, 362; emphasis in original). Moreover, it is "the reality upon which all other realities depend and from which they derive their ultimate meaning" (Reat and Perry: 1991, 87).

Buddhists believe that one can experience this ultimate reality (i.e. become enlightened) in this lifetime, overcoming the ontological boundaries perceived by conventional knowledge (Unno: this volume). But the tradition makes a distinction between such experience "with fuel remaining" (while still alive in the body) and "without fuel remaining" (when an enlightened person dies), the underlying metaphor here being that human existence is like a fire fueled by self-centered desires. Nirvana after death brings complete liberation from the limitations of existence, a foretaste of which can be experienced before death (Thanissaro Bhikkhu: 1993, 4f, 32ff). The transformative apprehension of Truth/Nirvana on this side of death necessarily occurs within the human condition of finitude and situatedness (cf. Hirota: this volume). As to the other side, when one fully experiences Nirvana "without fuel remaining," the Buddha's sidestepping of his disciple's question remains definitive for Buddhists.

2.2 *The Boundaries and Limits of Knowledge in Christianity*

Rudolf Otto, one of the classical theorists of the comparative study of religion, laid out his view of the core of religious experience in his 1917 book, *Das Heilige* (The Idea of the Holy). Otto believed that human beings sense the reality of Something Holy and Wholly Other than ourselves, which

he labeled the numinous, from the Latin *numen* (divine presence). Our creature-hood experiences the divine presence as a *mysterium tremendum et fascinans*, a mystery both daunting and fascinating, awe-full and wonder-full, uncanny yet attractive. Most pertinent to the present discussion, Otto explained that the numinous eludes our attempts to describe it. The deepest human response is speechlessness: "Let all the earth keep silence before him," Otto quotes the biblical prophet Habakkuk (^{2}1950, 211).

Otto's theories first emerged out of his study of Martin Luther's writings. Like most German scholar-theologians of his day, Otto wrote his dissertation on Luther, as well as his first book. He also devoted an entire chapter of *Das Heilige* to Luther, in which he cited one of Luther's sermons to illustrate the Protestant Reformer's response to divine grace: "Who will extol this enough or utter it forth? It is neither to be expressed or conceived. If thou feelest it truly in the heart, it will be such a great thing to thee that thou wilt rather be silent than speak aught of it" (103).[5]

Luther's sermon was based on Philippians 4:4–7, which includes the Apostle Paul's blessing, "And the peace of God, which passes all understanding, will keep your hearts and your minds in Christ Jesus" (RSV). Luther comments: "This peace of God is beyond the power of mind and reason to comprehend. Understand, however, [that] it is not beyond man's power to experience – to be sensible of. Peace with God must be felt in the heart and conscience."[6]

Thus, Christians believe they can know something about God in certain ways but not everything about God in every way. Particularly, the human mind is inadequate to grasp the fullness of the divine. In our finiteness, we cannot fully comprehend the Infinite. This reminds us of the view of Shinran and Pure Land Buddhism: Truth/Reality can be apprehended is some way, but not through discursive thought (Hirota: this volume). The deepest knowledge about God, according to Christianity, comes through revelation, uniquely in the incarnation of Christ. Yet, even as transcendence becomes immanent through revelation, it retains its ultimate hiddenness. As Antje Jackelén (this volume) notes, Christians tend to recognize that "knowing too little" about God in this sense is precisely as it should be.

The twentieth-century Protestant theologian Reinhold Niebuhr (1949, 152–173) spoke of the mystery surrounding human existence. According to Niebuhr, two types of people claim to know too much about this mys-

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[5] Otto's citation of Luther seems to be in error. The Luther experts at the Trinity Lutheran Seminary library and the Atlantis listserv identified the source of Otto's quote as Luther's Sermon on the Fourth Sunday in Advent, preached on either 23 December 1537 (Erlangen edition) or 20 December 1545 (Weimar edition). My thanks especially to Carla Birkhimer and Aija Bjornson for this information.

[6] Lenker: 1988, 110; Lenker provides an interpretive, rather than verbatim, rendering of Luther's sermons.

tery. One type – Niebuhr called them "irreligious" – denies any mystery at all, finding in natural causes "an adequate explanation of anything they may perceive" (153). The other type – Niebuhr called them "ostensibly religious" – claims to understand the mystery completely. "They know the geography of heaven and of hell," said Niebuhr, "and the furniture of the one and the temperature of the other" (154).

The Christian faith supports neither type of person, according to Niebuhr. "The Christian faith does not pretend to resolve all perplexities. It confesses the darkness of human sight and the perplexities of faith. It escapes despair nevertheless because it holds fast to the essential goodness of God as revealed in Christ ..." (169f). Christians find meaning in human existence and thus they are not "perplexed unto despair" because the surrounding mystery cannot be fully fathomed (169). As Gordon D. Kaufman (this volume) explains, the Christian faith offers a way to live a fruitful life in the face of ultimate unknowing.

As Tom Christenson (this volume) suggests, theological discourse resides at the limits of knowability, a confession of ignorance as much as of knowledge. Christian theology can say a lot about God but it cannot speak unequivocally – it can neither lay claim to "the last word" about God nor be certain to have gotten "the first word" about God completely right. Hence, Christianity, like Buddhism and other religions, has developed a *via negativa* in talking about transcendent reality, especially in its mystical heritage.

On his deathbed, St Anselm (d. 1109) expressed the hope that God would delay his passing "at least until I can settle a question about the origin of the soul, which I am turning over in my mind, ... for I do not know whether anyone will solve it when I am dead." (Southern: 1979, 142). We detect a hint of theological hubris here, to which even saints are susceptible. Not surprisingly, claims about the existence of an immortal soul draw severe criticism from materialists (e.g. B. Russell: 1957), but Christian writers also reject a know-too-much approach to such religious ideas (Jackelén: this volume).

2.3 The Boundaries and Limits of Knowledge in Science

Medieval perplexity about the soul has given way to the modern dilemma of the mind/body or consciousness/matter relationship, which has defied scientific explanation since Descartes (Unno: this volume). In his book *The Road to Reality*, mathematician and physicist Roger Penrose discusses his presupposition "that all of mentality has its roots in physicality." "This is indeed a prejudice," he admits, "for while it is true that we have no reasonable scientific evidence for the existence of 'minds' that do not have a

physical basis, we cannot be completely sure." (2004, 19). Like religion, science "cannot be completely sure" about everything, even in its own domain of knowledge. If I read Penrose correctly, he edges toward hubris in considering all "deep mysteries" as potentially solvable (17–23). Whether or not Penrose can be so accused, scientists are not typically hubristic. This trait may characterize scientism, but not true science.[7]

As Trinh Xuan Thuan (this volume) comments in discussing quantum uncertainty at the micro-level of material reality, the age-old human quest for absolute knowledge must be renounced. A key factor here is the inherent limitations in our knowledge due to the subject-object or observer-observed relationship. We, as investigating subjects, are integrally involved with the objects of our investigations since we belong to the same natural world, and thus we can never objectively know the reality of that world. Nature itself imposes a limit upon us, wrote physicist Niels Bohr, since "any observation necessitates an interference with the course of the phenomena [being observed], which is of such a nature that it deprives us of the foundation underlying the causal mode of description." (1934, 115). As Edward M. MacKinnon explains, "There is no way to sneak a peek at the objectively existing reality and then compare this with what the theory says about it." (1982, 339).

According to Bohr, the very "aim of physical science" has changed in the quantum era: "Indeed, from our present standpoint, physics is to be regarded not so much as the study of something *a priori* given, but rather as the development of methods for ordering and surveying human experience." (1963, 10). Bohr's claim that the quantum world is ontologically inaccessible is reported by his assistant, Aage Petersen: "There is no quantum world. There is only an abstract quantum physical description. It is wrong to think that the task of physics is to find out how nature *is*. Physics concerns what we can *say* about nature." (1963, 12; emphasis in original). Bohr and others who share his views are realists in that they assume the existence of an objectively real quantum world. However, their interest is not the ontology of that world, given the fixed limits of its knowability, but rather our epistemology regarding it.[8]

In the related field of mathematics, Kurt Gödel's incompleteness theorem also points up the limits of knowability. Gödel's theorem has been popularly misunderstood to mean that there are "unprovable mathematical propositions" (Penrose: 2004, 377; cf. Moore: 2005). Its significance is

[7] My thanks to Robert W. Numrich for clarifying this for me.

[8] Barbour (1997, 169) categorizes Bohr as a type of critical realist, Honner (1987, 151 f) as a relative realist. George Murphy reminds us here that "while Bohr's views on the interpretation of quantum theory have been very influential, they are not shared by all physicists" (personal communication).

not quite that dramatic but nonetheless pertinent: Gödel showed that no mathematical system can claim both completeness and self-consistency, for some of its propositions cannot be proved or falsified within itself (Albright: this volume). Thuan (this volume) explains the larger implication here: Some forms of knowledge cannot be gained via rationality.

The scientific method assumes that the material universe is understandable through rational inquiry. Perhaps this is not so – how can we know? As John R. Albright (this volume) reminds us, statements about what is ultimately "real" are metaphysical statements, beyond the purview of physical science. Why is there a universe at all? How did the laws of physics come into being so that the universe could in turn come into being? Leon Lederman, former director of Fermi National Accelerator Laboratory, agrees that such questions stand outside the purview of physics. "Go across the street to the theology school, and ask those guys," he counsels, "because I don't know." (Dreifus: 1998). "The laws of nature must have existed before even time began in order for the beginning to happen," writes Lederman. "We say this, we believe it, but can we prove it? No. And what about 'before time began'? Now we have left physics and are in philosophy." (Lederman and Teresi: 1993, 401).

"What would it mean," asks Stephen Hawking, "if we actually did discover the ultimate theory of the universe?" Such a question pertains to the issue of the boundaries and limits of knowledge within the purview of science, namely, the material universe. The notion of an "ultimate theory of the universe" appears hubristic, but Hawking's measured answer to his own question is anything but: "[W]e could never be quite sure that we had indeed found the correct theory, since theories can't be proved. But if the theory was mathematically consistent and always gave predictions that agreed with observations, we could be reasonably confident that it was the right one." ([2]1998, 185). Reasonable confidence is the best we can expect, even from the ultimate theory of the universe. Such a level of confidence should not be disparaged – the ultimate theory would be a remarkable achievement – but neither should it be mistaken for absolute confidence. Like religion, science can know quite a lot about its domain. Also like religion, it cannot know everything.

3 What Buddhism, Christianity, and Science Can Learn from Each Other

Niels Bohr did not shy away from metaphysics. His younger contemporary, Werner Heisenberg, considered Bohr "primarily a philosopher, not a physicist." (1967, 95). Heisenberg reported Bohr's statement "that I could see no reason why the prefix 'meta' should be reserved for logic and mathematics ... and why it was anathema in physics." (1971, 210). Many of Bohr's

views, including certain applications of his principle of complementarity, were dismissed in some circles as flights of mystical fancy. His interest in epistemological analogies between quantum physics and Eastern religious philosophies – he incorporated the yin yang symbol into his coat-of-arms, for instance – struck many fellow scientists as odd and has provided grist for the mills of popular books on science and religion (e.g. Capra: [3]1991).

But one of Bohr's most significant insights is supported by the present volume – the inherent inadequacy of conceptualization and language in apprehending and explaining reality. Heisenberg relates an outing in which "Bohr was full of the new interpretation of quantum theory." Reflecting philosophically, "Bohr began by talking of the difficulties of language, of the limitations of all our means of expressing ourselves, which one had to take into account from the very beginning if one wants to practice science … ." (1967, 106f). Bohr was preoccupied with the problem of trying to explain the quantum world in language designed for the macro world of our sense experiences. He was fond of the words "pictures" and "symbols" when discussing the limitations of language at both the macro and micro levels (Honner: 1987, 153–160). Bohr's assistant, Aage Petersen, relates a discussion between Bohr and unnamed others:

> He was forcefully stressing the primacy of language: "Ultimately, we human beings depend on our words. We are hanging in language." When it was objected that reality is more fundamental than language and lies beneath language, Bohr answered: "We are suspended in language in such a way that we cannot say what is up and what is down." (1968, 188).

Religions understand the condition of being suspended in languages that cannot contain perceived realities. Hence their use of metaphorical, symbolic, and *via negativa* expressions, as well as the frequent invocation of the notion of "mystery" (see Hirota, Ingram, Kaufman, and Unno: all this volume). As Christenson (this volume) implies, theological systems know better than to mistake their linguistic facility for real understanding. Neils Bohr "recognized similar problems for physicists and theologians in the application of language to the extraordinary events of the sub-atomic and the supernatural." (Honner: 1987, 180). Bohr's retort to Einstein's famous quip, "God does not play dice," during their running debate about quantum theory hinged on this issue. Wrote Bohr, "… I replied by pointing at the great caution, already called for by ancient thinkers, in ascribing attributes to Providence in everyday language." (1958, 47).

Here is a fruitful opening for dialogue between science and religion, where dialogue becomes an opportunity for mutual pondering of the limits of our pondering. At times in the conversation we must pause with Pascal in silent and humble contemplation of a reality that eludes us all in its fullness.

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Chapter 2
Science and Buddhism: Two Complementary Modes of Knowledge

Trinh Xuan Thuan

1 Introduction

For many scientists and religious thinkers, science and religion are independent and autonomous domains, with each discipline having its own methods of enquiry that can be justified on its own terms. In the words of the palaeontologist Stephen Jay Gould (1999), they are "non-overlapping magisteria" which co-exist in a spirit of respectful non-interference, but between which there cannot be any kind of dialogue: science's main aim is the investigation of how the universe and its contents came about and how they function, while religion concerns itself with issues of meaning, human values, and purposes. I will argue here that this is not the case for one particular spiritual tradition, Buddhism. On the contrary, there can be a fruitful and illuminating dialogue between the two domains. While it is true that the ultimate aim of Buddhism is not to find out about the world of phenomena for its own sake, it has thought deeply and in an original way about the nature of the world. It has done so for a therapeutic aim: it is by understanding the true nature of the physical world that we can clear away the mists of ignorance and open the way to enlightenment.

In section 2, I will discuss the magisterium of science and its limits. I will then describe in section 3 the magisterium of Buddhism, and why it can be considered a "science of the mind." In section 4, I discuss the nature of reality as seen respectively by contemporary science and Buddhism and show how these two views are mostly consonant rather than divergent, and how they illuminate each other. I conclude in section 5 that science must be complemented by spirituality so as to permit us to be human.

2 The Limits of the Knowable in Science

As we enter the twenty-first century, we are witnessing profound changes in the way the world is perceived. After dominating Western thought for some three hundred years, the Newtonian view of a wholly deterministic

and mechanistic universe is receding in favor of a world that is indeterministic and teaming with creativity.

2.1 The Old Deterministic Newtonian World

Newton thought the universe was a gigantic machine composed of inert particles subject to blind forces. If a system could be characterized at any particular instant, its entire past history could be recreated and its future predicted with just a few physical laws. The French physicist Pierre-Simon de Laplace summed up this triumphant determinism in his famous declaration:

> Consider an intelligence that, at any instant, could have a knowledge of all forces controlling nature, together with the momentary conditions of all the entities of which nature consists. If this intelligence were powerful enough to submit all these data to analysis, it would be able to embrace in a single formula the movements of the largest bodies in the universe and those of the lightest atoms; for it, nothing would be uncertain, the future and the past would be equally present to its eye. (1951, 4)

The future and the past were both embedded in the present, and time was effectively abolished. (This is to be contrasted with "growing block universe" theory of time in which the past and present exist, but the future does not.) There was a direct relation between cause and effect. The magnitude of the effect was invariably proportional to the intensity of the cause and could always be predicted accurately.

The universe was shackled in a straight-jacket that precluded any creativity and innovation. Everything was preordained, and no surprise was allowed. That prompted the German philosopher Friedrich Hegel to utter his famous outcry: "Nothing is ever new in nature." This gave rise to a curious dichotomy: On the one hand, the laws of nature were immutable and timeless; on the other, the world was contingent and continuously evolving.

2.2 Chaos Theory and the Demise of Determinism in the Macroscopic World

Determinism prevailed until the end of the nineteenth century. It came to be challenged, transformed, and ultimately swept aside by a far more exhilarating and liberating view in the twentieth century (Thuan: 2006). The role of chance, or what we would call contingency, was recognized in such varied fields as cosmology, astrophysics, geology, biology, and the cognitive sciences.

Our world has not only been molded by physical laws, but also by a succession of historical events. For example, one such contingent event is the asteroid that hit the Earth 65 million years ago, causing the disappearance

of the dinosaurs (along with three-quarters of the species on the planet), thus giving our mammal ancestors the chance to proliferate. That contingent event is responsible for our very existence. Laplace accounted for such contingent effects in his deterministic view by saying that even they can be predicted if their initial conditions (the initial position and velocity of the asteroid, the forces acting on it, etc.) can be known precisely enough. However, the French mathematician Henri Poincare, one of the pioneers of chaos theory, replied as follows to Laplace's deterministic credo:

> A cause so small as to escape our attention, determines a considerable effect that we cannot help but see. We then say that this was the result of chance. If we knew the laws of Nature exactly and the precise situation of the universe at the initial moment, we could then accurately predict the situation of this same universe at some future moment. But even if the laws of Nature held no more secrets for us, we could have only an approximate knowledge of the initial situation. If this allows us to predict a future situation with the same approximation, then this is all we need. We then say that the event has been predicted and that it is governed by laws. But this is not always the case. It can happen that small differences in the initial conditions create very large ones in the resulting phenomena. A tiny error in the initial state leads to an enormous error in the final state. Prediction becomes impossible. (1914, 68)

In this way, Poincare refuted the postulate at the heart of Laplace's argument, that it is possible to know the precise initial conditions of any phenomenon in the universe. From the inevitable large or small inaccuracies of the initial conditions, and the extreme sensitivity of certain systems to their initial conditions, any attempt to predict the future evolution of these systems is doomed to failure. This is a central tenet of chaos theory, which has become an important complement to physics to understand our world. This chance and indetermination affect not only the planets, stars, and galaxies, but also our everyday life. An alarm clock fails to go off, so a man misses his interview and the job he wanted. A speck of dust in the gas tank makes a car break down, so a woman misses her plane and escapes death when it crashes into the ocean a few hours later. Insignificant events and imperceptible differences in circumstances can radically alter someone's life.

Chaos lurks in the regular, and the unpredictable is never far from the predictable. A simplistic conception of the laws of cause and effect – in the way Newton and Laplace conceived it – is no longer defendable. In scientific terms, chaos is not a complete lack of order, as it is generally used by the layman. It has more to do with long-term unpredictability. Weather is an excellent example of a chaotic phenomenon. It is impossible to forecast with precision the weather more than a week in advance, because weather events are extremely sensitive to initial environment conditions. In order to predict long-term weather, we would need to know those initial conditions with an infinite precision, which is not possible. Even if we were to

acquire that perfect knowledge, it would be impossible to communicate it to our computers because of their finite memory. It would be vain, in an attempt to understand the weather's moods, to set up meteorological stations everywhere. There would still be undetectably tiny atmospheric variations. As they become amplified, these fluctuations can lead to either a storm or a beautiful blue sky. That is why chaos is often referred to by physicists as the "butterfly effect": the flapping of a butterfly's wings in the Amazonian forest can trigger a rainstorm in San Francisco.

The butterfly effect is even clearer when it comes to mental events. Tiny differences in the motivations behind our actions create radically courses of events, which can lead to a vast range of misunderstandings and conflicts. A feeling of hatred or ambition can set off a world war. For a determinist, if it were possible to know the initial conditions perfectly, no matter how subtle they were, and if we had the necessary computing power, we would be able to predict accurately how a series of events would unfold. But it is our very inability to know perfectly the initial conditions that makes it impossible to predict the future. The seeds of ignorance have been planted in the very workings of nature. Newton and Laplace's deterministic dream has faded away. Chaos presents an ineluctable limit on our knowledge.

2.3 Quantum Uncertainty in the Microscopic World

Indeterminism manifests itself not only in the macroscopic world, but also in the microscopic realm. The advent of quantum mechanics, the physical theory that describes the behavior of atoms and light, at the beginning of the twentieth century shattered further the rigid shackles of determinism. Quantum uncertainty replaced deterministic rigor in the atomic and subatomic world. This is expressed in the German physicist Werner Heisenberg's uncertainty principle, which tells us that is impossible to define precisely at the same time an electron's position and its momentum, equal to the product of the particle's mass by its velocity. As Poincare and the other pioneers of chaos theory showed that chaos fundamentally limits our prediction of certain events in the macroscopic world, Heisenberg demonstrated that there is a fundamental limitation to our ability to know the microscopic world.

To determine the position of a subatomic particle, we have to illuminate it with light. This position will be determined to within a distance about equal to the light's wavelength, the distance between two consecutive crests or troughs of the light wave. For example, if we want to know the position of the particle to within the size of the atom, or one-hundredth of a millionth (10^{-8}) centimeter, we will have to illuminate it with light in the X-ray range. But by using light with such a high energy, we inevitably disturb the

particle we are trying to pinpoint by imparting a momentum to it. That completely changes the momentum the particle had just prior to the observation. We are thus faced with a dilemma. We can choose to determine the position of the particle with the greatest accuracy possible by illuminating it with light of extremely short wavelength, which has a very high energy. We therefore cause a large perturbation, and have to resign ourselves to the fact that there is little we can know about its momentum. For example, if we desire to locate an electron to within one-hundredth of a millionth of a centimeter – roughly the size of an atom – the uncertainty on its momentum would be such that one second later, the electron could be anywhere within a radius of a thousand kilometers, which is more than the size of the state of Texas. Or else, we can decide from the outset that we are interested only in the particle's momentum, in which case we would illuminate it with light causing the least possible amount of disturbance – in other words, light with little energy and a very long wavelength. But, under those circumstances, the position would become a total blur.

There is thus a basic limitation to our knowledge of the atomic and subatomic world. There is no hope of ever measuring both the momentum and the position of a subatomic particle at the same time with any arbitrary accuracy. Heisenberg's uncertainty principle forces us to take the plunge and make a choice. Uncertainty is inherent to the world of atoms. Regardless of what we may do to increase the sophistication of our instrumentation, we will always run into this fundamental hurdle. The atomic world forces us also to be tolerant and renounce humanity's age-old dream of absolute knowledge. The degree of tolerance in the microscopic world is quantified by a number called Planck's constant. Heisenberg tells us that the product of the uncertainty on the position and that on momentum can never be smaller than Planck's constant divided by 4*pi*. If Planck's constant were equal to zero, positions and momenta could, of course, be determined simultaneously with any desired accuracy. But nature decided otherwise. Planck's constant is in fact not zero, but a very small number. In a system of units known as *cgs* – in which lengths are measured in centimeters, masses in grams, time in seconds, and energies in ergs – the constant is equal to 6.626×10^{-27} erg sec. As small as this number may be, it imposes a fundamental and absolute limit to what we may and may not know about the subatomic world.

All of this raises a question. If quantum fuzziness is so prevalent in the subatomic world, why is it that we seem to be shielded from it in everyday life? We are, after all, made of atoms. Why does this quantum uncertainty, which affects the behavior of atoms, not manifest itself on the scale of ordinary objects? The answer lies in the mass of macroscopic objects. Because they are typically big and have large inertia and momenta, they are not easily perturbed when illuminated. High-energy X-rays pass through our

bodies unimpeded, but they do not slam us against a wall. The impulse that light imparts on ordinary objects is all but negligible, and that is why the speed of a tennis ball, a car, or a plane can be measured as precisely as you want at the same time as their position.

2.4 The Dual Nature of Light and Matter

In the eighteenth century, there was a great debate about the nature of light: is it particle or wave? In his *Opticks*, published in 1704, Newton held the opinion that light has a particle nature. However, the English physicist Thomas Young demonstrated that light has a wave nature by carrying out a famous experiment now known as Young's two-slit experiment. The physicist illuminated two parallel slits with a single light source. He projected the image of the two slits on a screen located behind them. Young noticed that the image was not simply two bright parallel bands, as would be the case if light propagated as particles in straight lines. Instead, what he saw was a series of bright bands, spaced regularly and separated by dark bands called "interference fringes." This pattern of dark and bright striations could be explained only if light behaved like a wave. In such a picture, light was no longer constrained to propagate in straight lines. Light waves passing through both right and left slits could superimpose. Wherever the two waves arrived at the screen with the same phase, the crests of each wave would reinforce each other and produce a bright band. Where they arrived out of phase, the crest of one wave would superimpose on the trough of the other, and the two waves would cancel each other, resulting in a dark band. In those circumstances, adding light to light can result in darkness!

All this seems to make perfect sense for light. But things really become extraordinary when we repeat Young's two-slit experiment with electrons rather than light. We replace the light source by an electron gun similar to the type found in an ordinary television set, and the screen by an array of electron detectors. What is the behavior of the electrons as they pass through the slits? Our intuition tells us that there should be no interference fringes since the electron gun ostensibly fires electrons in the form of particles, not waves. We are in for a surprise. As it turns out, the detectors record precisely a series of maxima and minima in the number of electron hits, exactly like what was observed with light. One might think this is not particularly surprising. After all, water is made of H_2O molecules, and a water wave is produced by the coordinated motions of many water molecules. Maybe the wave-like behavior of electrons is somehow due to their coordinated motions. This has been shown not to be the case. The electron gun can be tuned all the way down until it fires only one electron at a time. The Young two-slit experiment with electrons can then be run over a long

period of time and the result is extraordinary: individual electrons moving to the detectors separately, one by one, still build up the interference pattern characteristic of waves. The conclusion is inescapable: Electrons must have undergone a radical metamorphosis during their travel to the detectors. An electron may have left the electron gun as a particle, but it must have turned into a wave by the time it reached the slits, since an interference pattern can be generated only by the interaction of two separate waves. In other words, the electron must have passed through both slits at the same time. Its wave nature gives it the ability to be simultaneously in two places; indeed, it can be anywhere at once. Its trajectory is no longer defined. Bohr's atomic model, in which electrons follow well-defined orbits around the atomic nucleus, like planets around the Sun, becomes meaningless. An electron can thus exhibit both the properties of a particle and that of a wave. This dual nature is also true for light. At the beginning of the twentieth century, Einstein showed that the photoelectric effect – the ejection of electrons from the surface of a metal when one shines light on it – can only be understood if light comes in the form of "quanta" of energy or "photons."

Thus, the particles we call photons and electrons, as well as all the other particles of matter, are double-faced, like Janus. Sometimes they appear as particles, sometimes as waves. This is one of the strangest and most counterintuitive findings of quantum theory. Let us consider the case of an electron. If it appears as a wave, then quantum physics says that it spreads out in all directions through space, like the ripples made by a pebble thrown in a pond. We can then say that the electron may be present everywhere at the same time. Quantum mechanics states that when an electron is in this wave state, we can never predict where it will be at any given moment; all we can do is evaluate the probability of its being in a particular position. The German physicist Max Born showed that this probability is equal to the square of the amplitude of the wave function given by the Austrian physicist Erwin Schrödinger. The chance of finding the electron is highest at the crests of the wave function and lowest at the troughs. But even at the crests, there is never complete certainty that the electron will be found there. The chances may be 80 percent or 92 percent, but never 100 percent.

Although Einstein famously said that "God does not play dice," all experimental evidence does show that he was wrong and that the quantum world is ruled by probability. To say that chance lies at the heart of matter does not mean that all knowledge is out of reach or that the laws of physics no longer apply. On the contrary, quantum mechanics predicts many properties of matter, always in perfect agreement with observations. The only catch is that such predictions never apply to individual events, but only to a collection of many events. The situation is analogous to that of the toss of a coin in the air. The laws of probability do not tell you whether, on the very next throw, it will land on heads or tails. All they tell you is that when you

throw the coin repeatedly, on average it will land on heads half of the time, and on tails the other half. The same goes for the atomic and subatomic world. An individual event is not causally determined, but the behavior of a whole series of similar events is. It is this vestigial determinism that allows our computers and stereos to work. If everything in their electrical circuits was random, they would not function.

2.5 The Interaction between the Observer and the Observed

Thus the particle and wave aspects cannot be dissociated; rather they complement one another. This is what the Danish physicist Niels Bohr called the "principle of complementarity." He saw this complementarity as the inevitable result of the interaction between a phenomenon and the apparatus used to measure it. According to him, it is not so much reality that is dual, but the results of experimental interactions. For him, there was an "impossibility of any sharp separation between the behaviour of atomic objects and the interaction with the measuring instruments which serve to define the conditions under which the phenomena appear." (Bohr: 1958, 39f). The act of determining one aspect of an electron (its particle nature for example) eliminates the possibility of determining the other. Thus, talk of an "objective" reality without any observer is meaningless, because it can never be perceived. All we can do is capture a subjective aspect of an electron, depending on the observer and the apparatus used. The form that this reality then takes is inextricably bound up with our presence. We are no longer passive spectators before the tumult of atoms, but full participants. In the experiment involving electron beams passing through parallel slits, we have no way of telling which slit an electron went through without activating detectors behind each slit to monitor its passage. But the very act of spying perturbs the system so that we cannot have access to reality as it was before an observation. As long as we do not observe it, a subatomic particle can be here, there, and everywhere. It then dons its wavelike appearance and interference fringes appear. It is only when we activate the detector and observe it that the particle decides to be here *or* there, that it materializes as a particle, and that interference fringes vanish. This materialization as a particle is called the "collapse" of the wave function. Prior to the observation, the electron behaves as a wave and remains pure potentiality. That potentiality becomes actualized only after the observation.

Whereas for Newton and Laplace the world was a well-oiled machine that kept running on its own without any divine or human intervention, quantum mechanics reinstated the observer to pre-eminent status. In a manner of speaking, the external world is defined by the questions we ask ourselves about it. According to Bohr and Heisenberg, when we speak of

atoms and electrons, we should not see them as real entities, with well-defined properties such as speed and position, tracing out equally well-defined trajectories. The "atom" concept is simply an image that helps physicists put together diverse observations of the particle world into a coherent and logical scheme.

2.6 Gödel's Incompleteness Theorem and the Limits of Reason

We have seen that the theory of chaos imposes a fundamental limit to our knowledge of the macroscopic world and that the theory of quantum mechanics does the same for the microscopic world. These scientific theories are based on conceptual thought. In the early twentieth century, the Austrian mathematician Kurt Gödel showed by his famous Incompleteness Theorem that, in our attempts to know the world, even conceptual thought has limits, at least in the domain of mathematics. This theorem is generally considered to be the twentieth century's most important discovery in logic. In 1900, the German mathematician David Hilbert challenged his colleagues to devise a general procedure for determining whether any given arithmetic proposition is true or false. Doing so would put all of arithmetic (and, later, all mathematics) on a consistent logical basis. Gödel took up the challenge, but not in the way Hilbert had intended. In 1931, he published what is perhaps the most extraordinary and mysterious theorem in mathematics. It showed that any coherent arithmetic system must contain propositions that are "undecidable" – that is to say, mathematical statements that can't be proved or disproved logically if one stays within the system. In other words, one cannot prove the coherence of that system without going outside of it and adding supplementary axioms. Thus any such system is intrinsically incomplete, and hence the name Incompleteness Theorem.

Gödel's proof of this theorem caused a large stir in the world of mathematics (Nagel and Newman: 1958). He had shown that logic is fundamentally limited and that Hilbert's dream – to come up with a rigorous proof of the overall coherence of mathematics – was doomed to failure. The theorem has had huge repercussions in other fields, such as computer science and philosophy: In computer science because Gödel's theorem means that there exist mathematical problems that cannot be solved by a computer; in philosophy, because the power of rational thought has been shown to possess limits since some forms of knowledge cannot be acquired by reason and logic alone.

2.7 *Science Does Not Provide a Moral Guide*

Science has further limitations. From the seventeenth century, that witnessed the birth of modern science, to the present time, science has come to be considered by many people to be synonymous with knowledge, capable of solving all of our problems. And the all-powerful influence of science and its derivative, technology, on our way of living is likely to continue in the future. The exponential increase in the accumulation of information is not about to slow down. A strong faith in the revelations of science and the efficiency of technology has developed.

But as shown in the preceding paragraphs, we have become aware with time that science by itself is incapable of revealing all truths and solving all problems, and that while technology has produced huge benefits, the ravages and harms that it has caused on humanity and our ecosystem are at least as great. Science has another fundamental limitation concerning morals and ethics. By the very nature of its aims and methods, it is incapable of providing answers to such questions as: How should I lead my life? How should I live in society? Science does not produce wisdom. It cannot provide us with values. It cannot tell us about how to conduct our lives and how we should behave. While the insights of science have helped us change the world, it cannot enlighten us about the path we should follow in life. Scientific knowledge has no connection with goodness or altruism, it cannot create moral values.

3 *Buddhism: A Science of the Mind*

3.1 *A Knowledge with a Therapeutic Aim*

Coincident with the rise of science, many people, especially in some democratic, secular states, have become disillusioned with the teachings of the world's religions, leading to a decline of religious practice. At the same time, religion has often become more radical in some states, with a strong rejection of Western science. I will argue here however that the great spiritual traditions, whether based on dogma or on pure contemplative experience, not only give us another window to peer at reality, they also provide powerful moral and ethical rules that we can use to structure and inspire our lives. Science and spirituality are both valid in their respective domains and they complement and illuminate each other.

I shall focus here on the spiritual tradition I am most familiar with, Buddhism. For me, Buddhism is also a form of science, albeit a "science of the mind." It is a contemplative science in which the mind investigates the mind, in order to dispel the fundamental delusions that generate so much

suffering for ourselves and others. Buddhism stresses the importance of elucidating the nature of the mind through direct contemplative experience. Over 2,500 years, it has developed a profound and rigorous approach to understanding mental states and the ultimate nature of the mind. The mind is behind every experience in life. It determines the way we see the world and others. It takes only the slightest change in our minds, in how we deal with mental states and perceive people and things, for our inner world to be turned completely upside-down.

The main difference between the pursuit of knowledge in science versus the same pursuit in Buddhism is their ultimate goals. The purpose of science is to find out about the world of phenomena. In Buddhism, knowledge is acquired essentially for therapeutic purposes. The objective is to free ourselves from the suffering caused by our undue attachment to the apparent reality of the external world and by our servitude to our individual egos, which we imagine reside at the center of our being. By understanding the true nature of the physical world, we can clear away the mists of ignorance and open the way to Enlightenment.

Modern science is not Buddhism's main preoccupation. But experience shows that it is necessary to understand correctly the nature of the exterior world and of the ego, or what the physicist calls "outer reality" and the psychologist "inner reality," if we want to eliminate ignorance. By ignorance, Buddhism does not mean a simple lack of information. Rather, it means a false vision of reality that makes us think that things we see around us are permanent and solid, or that our egos are real. This leads us to mistake fleeting pleasures for lasting happiness. Such ignorance can sometimes also make us build our happiness on others' misery. Thus, little by little, we create ever greater mental confusion until we behave in a totally egocentric manner. Ignorance and confusion feed on themselves until our inner peace is completely destroyed. In Buddhism, one does not acquire knowledge for pure knowledge. Rather knowledge is used as an antidote to suffering. Thus, in the pursuit of knowledge, it is best to concentrate on searching for those answers that can alleviate suffering, and not pay undue attention to superfluous questions. That is the meaning of the following parable. The Buddha once picked up a handful of leaves and asked his monastic disciples whether there were more leaves in his hand or in the forest. His disciples replied, of course there are more in the forest. The Buddha went on to explain that the leaves in his hand represented the knowledge that leads to Nirvana, the end of suffering (see Rahula: [2]1974, 12). In this way, the Buddha showed that not all questions are necessary. The world offers limitless fields of study, as numerous as the leaves in the forest. But if what we want more than anything else is the elimination of suffering, then it best to direct all our attention to that aim, and gather only the knowledge that is directly relevant to our quest.

3.2 The Path to Enlightenment

Buddhism thus establishes a natural ranking between different forms of knowledge, those that help us in our objective of dissipating suffering, and those that are of little use toward that aim, no matter how interesting they may be. However, if we want to eliminate ignorance, experience shows that it is necessary to have a correct understanding of the nature of the exterior world and of the ego, or what we call reality. The Buddha made the access to "true" reality the central theme of his teaching. Buddhism calls the elimination of ignorance Enlightenment. This is a state of supreme knowledge, combined with infinite compassion. Knowledge, in this case, does not mean the mere accumulation of data or a description of phenomena down to the finest details. Enlightenment is an understanding of both "relative reality" – the way in which things appear to us – and "ultimate reality" – the true nature of these same appearances. This dual nature applies to our minds as well as the external world. Such knowledge is the basic antidote to ignorance and suffering. But the simple accumulation of knowledge is not enough. The notion of Enlightenment contains not only the idea of knowledge but also that of compassion. If one accumulates knowledge, but attachments such as hatred, pride, and jealousy remain as strong as before, then one would not have made any progress. If one amasses intellectual learning without lessening one's egoism and increasing one's altruism, then one would have wasted one's time and efforts.

4 Science, Buddhism, and the Nature of Ultimate Reality

4.1 Comparison of the Methods for Investigating Reality in Buddhism and Science

To dissipate ignorance, Buddhism has long been asking questions that are astonishingly similar to those that science is investigating. Can separate, indivisible particles be the building blocks of the world? Do they really exist, or are they just concepts that help us to understand reality? Are the laws of physics immutable, and do they have an intrinsic existence, like Platonic ideals? What is the origin of the world of phenomena, the world that we see as "real" around us? What is the nature of space and time? What is the relationship between the animate and the inanimate, between the subject and the object?

To answer those questions, Buddhism has used investigative methods that, at first glance, appear to be very different from those of science. In science, intellect and reason have the leading roles. Science gathers knowledge about the world and condenses that knowledge into laws that can be tested.

By dividing, categorizing, analyzing, comparing, and measuring, scientists express these laws in the highly abstract language of mathematics. Intuition is not absent in science, but it gives results only if it can be formulated in a coherent mathematical structure and validated by observation and analysis. By contrast, intuition – or inner experience – plays the leading role in the way Buddhism approaches reality. Buddhism is mainly concerned with our inner self while science's main preoccupation is the external world. Rather than breaking up reality into its different components like science does in its reductionist method, Buddhism with its holistic approach aims to understand it in its entirety. Buddhism does not make use of sophisticated instrumentation such as large telescopes, particle accelerators, or sensitive microscopes which form the basis of experimental science, but has for its sole instrument the mind.

Given these seemingly profound differences in their methods and aims, can there be a basis for a dialogue between science and Buddhism? The answer is an unequivocal yes. A closer look reveals that Buddhism, just like science, relies also on the experimental method to find out about reality. First, the Buddhist method of analysis often makes use of "thought experiments" that are also widely used in science. These are hypothetical experiments conducted in the mind, which lead to irrefutable conclusions, although the experiments are not actually carried out. This technique has often been used by the best practitioners of science, such as Albert Einstein. For example, when studying the nature of space and time, the physicist saw himself astride a particle of light. When thinking about gravity, he imagined himself in an accelerating elevator. Likewise, Buddhist scholars use thought experiments to dissect reality. Second, Buddhism resembles science in that it encourages scepticism in the prevailing beliefs. Buddhist research is not bound by rigid dogma. It is ready to accept any vision of reality that is perceived as authentic. One of its main goals is precisely to bridge the gap between the way things really are and the way they seem to be. The Buddha often put his disciples on their guard against the dangers of blind faith. He said, "Investigate the validity of my teachings as you would examine the purity of gold, rubbing it against a stone, hammering it, melting it. Do not accept my words simply out of respect for me. Accept them when you see that they are true." (Shastri: 1968, teaching no. 3587). The current Dalai Lama (2005) has said that Buddhism stands ready to revise its beliefs at any moment if they are proved to be wrong by modern experimental science. Not that Buddhism has any doubts about the basic truth of its discoveries, nor does it expect that the results it has accumulated over 2,500 years of contemplative science will suddenly be invalidated. The countless metaphysical debates that Buddhism has conducted over the centuries with Hindu philosophers, and the dialogues it continues to have with science and with other religions, have allowed it to hone, focus, and widen its understanding of the world.

I will explore below how Buddhism's view of reality can shed light on and complement our understanding of the limits of the knowable in science described above, in both the macroscopic and microscopic worlds. I will first discuss and compare the worldviews of Buddhism and science by examining in turn each of the three fundamental tenets of Buddhism: impermanence, interdependence, and emptiness. I will show how these basic concepts are in deep consonance with modern scientific views of the universe. I will then discuss the issue of the beginning of the universe, which the standard Big Bang theory postulates and which Buddhism rejects. Lastly, I will compare the scientific view with that of Buddhism on the subject of consciousness.

4.2 The Impermanence of Phenomena

Buddhism distinguishes two types of impermanence. There is first the gross impermanence which is manifest in such events as the passage from youth to old age, the changing seasons, the erosion of mountains, or our varying emotions. Then there is the subtle impermanence which refers to changes of everything that exists in the shortest conceivable period of time. According to Buddhism, the universe is not made up of solid, distinct entities, but of a vast stream of events and dynamic currents that are all interconnected and constantly interacting.

This concept of perpetual, omnipresent change is consistent with our modern scientific conception of the universe. We now know that everything is changing and moving, from the tiniest atom to the entire universe. The universe has a history: a beginning, a past, a present, and a future. In addition to the expansion of space, all of the universe's structures – planets, stars, galaxies, and galaxy clusters – are in perpetual motion: they rotate about their axes, orbit, fall toward or move apart from each other. They, too, have a history. Stars are born, reach maturity, and die. Their lifetimes span, not about a hundred years like for human beings, but millions to billions of years. Impermanence also rules the atomic and subatomic world. Because of the quantum uncertainty of energy, space around us is filled with an unimaginably large number of "virtual" particles, with infinitely short life cycles of 10^{-43} second (the Planck time). Hundreds of billions of neutrinos created at the beginning of the universe are streaming through our bodies every second. The particles that make up matter can be unstable, and so break up spontaneously. For example, a free neutron will survive for only about 15 minutes before spontaneously transforming itself into a proton, emitting an electron and an antineutrino in the process. Or else the particles can be stable, but then interaction with other particles make them alter their nature or even disappear. Thus, when a proton interacts with an

electron, it may become a neutron and emit a neutrino (in the event that the two particles do not scatter elastically).

The Buddhist concept of impermanence gives us some insight on the nature of chaotic phenomena in nature. We have seen that chaos results from our inability to know perfectly the initial conditions of certain events, which in turn makes it impossible to predict their future. Because of subtle impermanence, conditions are constantly changing and since a measurement occurs in time and cannot be truly instantaneous, it can never be absolutely accurate and we are condemned to possess only an imperfect knowledge of the initial conditions. The uncertainty principle does in fact state that, given that any measurement implies an exchange of energy, it cannot be made in zero time. This is because the shorter time for the measurement, the more energy is needed. An instantaneous measurement would therefore require infinite energy, which is impossible. Because of subtle impermanence, the dream of knowing all the initial conditions with perfect precision is mere delusion.

4.3 The Interdependence of Phenomena

The second basic tenet of Buddhism is the interdependence of phenomena. This states that an object can be defined only in terms of other objects: it exists only in relationship to others, and particularly to ourselves; it cannot exist inherently, or be its own cause. Our daily experience makes us think that things possess a real objective independence, independently of our presence, as though they existed all on their own and had intrinsic identities. Buddhism maintains that this way of seeing phenomena is just a mental construct. For Buddhism, an event can happen only because it is dependent on other factors. Any given thing in the world can appear only because it is connected, conditioned, and in turn conditioning. An entity that exists independently of all others – including ourselves – as an immutable and autonomous entity could not act on anything, or be acted on itself. As B. Alan Wallace puts it:

> Human beings define the objects and events of the world that we experience. Those things do not exist intrinsically, or absolutely, as we define or conceive of them. They do not exist intrinsically at all. But this is not to say that they do not exist. The entities that we identify exist in relation to us, and they perform the function that we attribute to them. But their very existence, as we define them, is dependent upon our verbal and conceptual designations. (1996, 120).

The Buddhist notion of interdependence is strikingly similar to the quantum mechanical notion of relationship between the observer and the observed. Niels Bohr emphasized the notion of "relation." He spoke of the impossibility of going beyond the results of experiments and measure-

ments: "In our description of nature the purpose is not to disclose the real essence of phenomena but only to track down, so far as it is possible, relations between the manifold aspects of our experience." (Bohr: 1934, 18). Bohr's sentence finds an echo in the remark by Nagarjuna, the great second-century Indian Buddhist philosopher: "The nature of phenomena is that of mutual dependence; in themselves, phenomena are nothing at all." (1993, 240). Only relationships between objects exist, but not the objects themselves.

4.4 Reality as Emptiness

Because the very nature of light and matter becomes subject to interdependent relationships and can change because of an interaction between the observer and the object under observation, it is no longer intrinsic. Because a photon or an electron is a wave or a particle depending on how we observe it, it cannot be said to exist as an entity with an inherent existence. Moreover, there is Heisenberg's uncertainty principle: we cannot define precisely at the same time an electron's position and its momentum. Because the act of determining one aspect of the electron precisely eliminates the possibility of determining with certainty the other, talk of an "objective" reality without the presence of an observer is meaningless. According to Bohr and Heisenberg, we can no longer talk about atoms and electrons as being real entities with well-defined properties, such as momentum and position. We must consider them as part of a world made up of potentialities and not of objects and facts. In quantum physics, the concept of a trajectory does not exist. These scientific concepts are consistent with the Buddhist concept of "emptiness," the absence of intrinsic existence. The notion of emptiness or vacuity derives from the concept of interdependence: since everything is interdependent, nothing can be self-defining and exist inherently. Interdependence can be understood in two complementary ways. The first is "*this* arises because *that* is," which comes down to saying that things do exist in some way, but nothing exists on its own. The second is "*this*, having been produced, produces *that*," which means that nothing can be its own cause.

Buddhism maintains that the idea of a solid reality that has dominated Western philosophical, religious, and scientific thought for over two thousand years is not correct. But when Buddhism states that reality is "empty," it does not deny that phenomena really do occur. However, it argues that they are "dependent," that they do not exist in an autonomous way. Their way of "being" is always in relation to one another, never in and of themselves. Buddhism does not accept the usual notion that "things" precede relationships. Rather, the characteristics of phenomena are defined only through relationships. Thus, Buddhism's position is neither nihilistic nor

idealistic: it doesn't deny conventional reality because we experience it and measure it with our instruments. But neither is it realistic or materialistic, i.e. it does not reify the world by postulating the existence of immutable matter made of solid parts. For Buddhism, both opposing points of view, nihilism at one extreme and materialistic realism at the other, are erroneous. The correct position is the Middle Way where there is neither nothing (nihilism) nor something (materialism or realism). The seventh Dalai Lama summarized this idea in a verse:

> Understanding interdependence, we understand emptiness
> Understanding emptiness, we understand interdependence.
> This is the view that lies in the middle,
> And which is beyond the terrifying cliffs of eternalism and nihilism.
> (Mullin: 1985, 118).

This idea is echoed in quantum mechanics by the warning of the Austrian physicist Erwin Schrödinger against a purely materialistic view of atoms and their constituents: "It is better not to view a particle as a permanent entity, but rather as an instantaneous event. Sometimes these events link together to create the illusion of permanent entities." (1951, 47). Because of this similarity of views between Buddhism and quantum physics, it is no surprise that the founders of quantum theory (Bohr, Heisenberg, Schrödinger, etc.) turned to Eastern philosophy for help to sharpen their philosophical understanding of quantum mechanics.

4.5 Did the Universe Have a Beginning?

Let's turn our attention now to cosmology. In our present state of knowledge, the Big Bang is the theory that best explains the origin of the universe. Cosmologists think that the universe began some 13.7 billion years ago when an unimaginably small, dense, and hot concentration of energy exploded, in the process also creating space and time. Elementary particles (quarks and electrons, for instance) arose out of the primordial vacuum and came together to form atoms, then molecules, and finally the stars. Those stars assembled to create galaxies, each containing several hundred billion stars, and the hundreds of billions of galaxies in the observable universe formed an immense tapestry occupying the cosmos. The infinitely small has spawn the infinitely large. This scientific concept of an *ex nihilo* creation, a creation out of nothingness, is not compatible the Buddhist view. According to Buddhism, time and space are just concepts created by our perception of the world, and have no existence apart from our perception. The idea of an absolute beginning of time and space is therefore flawed according to Buddhist thinking. Furthermore, because everything is interdependent, Buddhism believes that nothing, not even the start of space and

time, can come about without causes or conditions. As Shantideva wrote in the seventh century:

When nonbeing prevails, if there's no being,
How could being ever supervene?
For insofar as entity does not occur,
Nonentity itself will not depart.

And if nonentity is not dispersed,
No chance is there for entity to manifest.
Being cannot change and turn into nonbeing,
For otherwise it has a double nature. (1997, 147 f).

Thus, for Buddhism, the world of phenomena cannot have come from nowhere. Because things have no independent reality, they cannot begin or end as distinct entities. In other words, nothing can start (or cease) to exist. There can only be transformations. From this point of view, the Big Bang must then be a mere episode in a continuum without a beginning or an end. The only cosmological model that is consistent with this viewpoint is a cyclical model in which the universe has undergone an infinite number of Big Bangs and Big Crunches (the opposite of Big Bangs) in the past, and will continue to do so in the future. In this case, the issue of how the universe could possibly have arisen, *ex nihilo*, at zero time is avoided. Because no creation is required, Buddhism has no need for a creator God.

What do the latest cosmological observations say about the future evolution of the universe? Will it reach a maximum radius and collapse back on itself, undergoing a Big Crunch, or will it expand forever? Because of the discovery in 1998 that the universe is filled with a dark energy that accounts for some 74 percent of its mass and energy content and that accelerates the expansion of the universe, we cannot say for sure. The reason is that we do not have the slightest idea of the nature of that dark energy. While the jury is still out on this issue, there does exist a cyclical theory of the universe according to which our cosmic history consists of repeating cycles of evolution (Steinhardt and Turok: 2007), which would be consistent with the Buddhist worldview.

4.6 Streams of Consciousness

We turn now to neurobiology. According to Buddhism, there is a "stream of consciousness" associated with each person. The succession of material states into which that stream passes (the words "reincarnation" and "rebirth" are just approximate terms to designate that process) are comparable, to a certain extent, to something like a radio wave which transmits information from one location to another. An individual's future lies in the transformation of that

wave. The nature of one's actions and thoughts determines the states associated with one's consciousness. Buddhism considers that the material universe and consciousness have always coexisted since beginningless time and that consciousness is separate from and transcends the physical.

How does this point of view compare with that of modern neurobiology? Biological sciences are still a long way from being able to explain the origin of consciousness. However, given the present state of our knowledge, the vast majority of biologists think that there is no need to postulate streams of consciousness that coexist with matter. They hold that the former can emerge from the latter, that mind can arise from matter. According to them, consciousness arose once the networks of brain cells in living beings reached a certain threshold of complexity. In their view, consciousness emerged, just as life itself, from the intricate assembly of inanimate atoms. If further research shows this to be correct, then this would be in contradiction with the Buddhist view on consciousness.

5 *Spirituality Is Not a Luxury but a Necessity*

We have seen above that there is a definite convergence and consonance between the Buddhist and scientific visions of reality. Some of Buddhism's views on the world of phenomena are strikingly similar to the underlying notions of modern physics – in particular, its two main grand theories: quantum mechanics, which is the physics of the infinitely small; and relativity, the physics of the infinitely large. Although science relies on sophisticated instrumentation to investigate reality, while Buddhism has for its sole instrument the mind, this does not lead to an insuperable opposition, but rather to a harmonious complementarity. That is because both are quests for the truth, and both use criteria of authenticity, rigor, and logic.

Thus, the concept of subtle impermanence sheds light on why we can never know perfectly the initial conditions of a chaotic event and predict its future evolution. The concept of interdependence is echoed by the quantum mechanical relationship between the observer and the observed. The concept of emptiness, the absence of intrinsic existence, finds its scientific equivalent in the dual nature of light and matter. Because a photon or an electron is a wave or a particle depending on how we observe it, they cannot be said to exist as entities with an inherent existence. The scientific jury is still out on the issue of an eternal universe and that of consciousness, but it is already abundantly clear that a dialogue between science and Buddhism does help us to deepen our understanding of the world (Ricard and Thuan: 2001; Thuan: 2006).

But science by itself is not complete. It reveals to us conventional knowledge. Its aim is to understand the world of phenomena. Its main focus is the

understanding of the physical universe, considered to be quantifiable and objective, so as to gain control over the natural world. However, Gödel's Incompleteness Theorem has shown us the limits of reason to attain ultimate truth, at least for arithmetic systems. Uncertainty, indetermination, unpredictability, incompleteness, undecidability – science knows now that it cannot know it all. To go to the end of the road, we must go outside the system and turn to other modes of enquiry, such as spirituality. While science provides us with information, it brings about no spiritual growth or transformation. It does not provide any moral or ethical guidance. By contrast, the spiritual or contemplative approach must lead to a profound personal transformation in the way we perceive the world and act on it. It must instil in us a profound moral sense. Buddhism stresses the importance of elucidating the nature of the mind through direct contemplative experience. As a complement to science, we must therefore cultivate a "science of the mind."

The latter is not a luxury but a necessity. Science must thus be complemented by spirituality to give us a larger conception of life. It must go beyond the view of traditional science that focuses exclusively on the objective third-person aspect of the world and put also emphasis on its first-person aspect. It must take into account the important role of subjective experience. As the physicist Werner Heisenberg has put it so eloquently: "I consider the ambition of overcoming opposites, including also a synthesis embracing both rational understanding and the mystical experience of unity, to be the *mythos*, spoken or unspoken, of our present day and age." (1974, 38).

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Chapter 3
Buddhism and the Epistemic Discourses of Modernity[1]

David L. McMahan

1 Introduction

In discussing the question of the limits of knowledge in Buddhism, the most sensible thing to do would be to go to authoritative classical texts that address epistemological issues. These texts would range from carefully circumscribed philosophical works that limit the means of valid knowledge (Sanskrit, *pramanas*) to perception and inference, on the one hand, to visionary religious texts with extravagant claims about the complete omniscience of a Buddha on the other. All of these would likely leave most Western readers with the feeling that the ancient Buddhists had insightful and fascinating things to say about knowledge; yet they may also find these ideas somehow irreducibly foreign in ways that might be difficult to pinpoint to those unfamiliar with the wider cultural and religious contexts within which the ideas emerged. The often unstated assumptions, premises, and presuppositions upon which the great Buddhist thinkers, such as Nagarjuna, Dharmakirti, and Dignaga, made their epistemic inquiries were deeply embedded in the cultures of ancient and medieval South Asia. They were unstated because the original audience – no doubt a small minority of educated monks – largely shared and understood them.

When stripped of this larger context, classical Buddhist thought can be brought into other conversations that do not share these premises and presuppositions, as they have, for example, when Buddhists began to arrive in ancient China and, in the last century-and-a-half, when Western modernity began seriously to engage Buddhist thought. Such decontextualization, nevertheless, always entails some ideological violence as the cultural girders supporting systematic thought are knocked down and replaced with those of those of a very different culture. Philosophical and religious thought must then survive in an environment other than that which it had originally evolved; it must adapt to favorable conditions and occupy a niche in

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[1] Portions of this paper are taken from the manuscript of a my forthcoming book, *The Making of Buddhist Modernism* (New York: Oxford University Press, 2008).

another culture's ecology of ideas. When placed into such an environment, it must make new connections with the presuppositions, premises, and assumptions of an entirely different ideological ecosystem. It must take on new meanings as translators and interpreters strike notes that resonate with the underlying harmonies of the new culture. Meanings that made sense in one cultural context are shed like vestigial organs and new meanings are grafted on, sometimes uncomfortably, as the system of thought is called upon to answer new questions and meet novel needs.

With these thoughts in mind, I would like to address the question of knowledge in Buddhism not by excavating the epistemological ideas of Sanskrit, Pali, Tibetan, or Chinese texts, but rather, by examining in broad sketches how Buddhists and Buddhist sympathizers[2] have attempted to decontextualize Buddhism from its ecological niches in various Asian lands and integrate it into the epistemological frameworks established by modernity. I say "modernity" rather than "the West" because by the time these efforts were underway in the late nineteenth century, modernity was already becoming globalized, and Buddhism had its own indigenous Asian modernization movements that drew from Western sources but had their own flavor. The "new culture" to which Buddhism had to adapt was not just the culture of the West but also the modernizing cultures of Japan, Ceylon (now Sri Lanka), and other places where Buddhism had traditionally thrived.

This approach does not really answer the question, What are the limits of knowledge in Buddhism?, but rather asks, How was Buddhism enlisted in asking the question of knowledge, its means, and its limitations not on its own indigenous terms but on distinctively modern ones? How, in other words, has Buddhism taken its place in the epistemological discussions of the modern world, dominated as it is by approaches to knowledge that originated in the West? Exploring this question will allow us to clarify the issue of knowledge in modern forms of Buddhism by placing the issue in its recent historical contexts. I would like to suggest that the challenge Buddhist apologists faced as they began to engage with Western modernity in the late-nineteenth century was to stake Buddhism's epistemological claims in between three broad constitutive discourses of modernity: scientific rationalism, Romanticism, and Western monotheism (mainly Protestant Christianity).[3] In staking their claims for Buddhism in relation to these discourses, Buddhists and Buddhist sympathizers attempted both to

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[2] Thomas Tweed: 1999 coined the term "Buddhist sympathizer" for people, mainly in the West, who are sympathetic to and influenced by Buddhism, practicing certain elements of it but not identifying themselves as Buddhists.

[3] For an expansive exploration of these discourses and their place in modern thought, see Taylor: 1989.

harmonize with, and in some cases critique, all three of these discourses in order to show, first, that Buddhism is a worthy participant in modern epistemological conversations – i.e. that it didn't operate on such radically different assumptions that it must be relegated to the Otherness of the "premodern" – and second that it could in fact contribute something valuable to these discourses. First, I will address the way apologists placed Buddhism in the tension between Christianity and scientific rationalism.

2 *Buddhism and Scientific Rationalism*

By scientific rationalism I mean the ideas and practices derived from the general epistemological claim of the Enlightenment – that knowledge comes from empirical observation and reason. This variety of rationalism arguably inaugurates the modern era and institutes a new approach to knowledge. It entails a more disengaged and instrumentalist approach to reason than we see in previous periods, sees the world in largely mechanistic terms, and promotes the scientific method as the exclusive tool for ascertaining empirical truths. It claims that in principle everything is explainable in scientific terms. The limits of knowledge are whatever the limits of observation and reason are in a given case. Of course, this is a quick sketch, over-generalized almost to the point of caricature, but I have limited space, and this gives us a basic idea with which to work.

In the late nineteenth century, Buddhist apologists began to draw heavily upon this scientific rationalist discourse as it was re-interpreted not only to Westerners but also to modernizing Asians. Buddhist modernizers from Japan and Ceylon, as well promoters in Europe and North America, presented Buddhism as harmonious with the scientific method and with the startling new scientific discoveries and theories of the time. An Indian encyclopedia article conveys the flavor of this approach. It states that, in contrast to the "unscientific or speculative religion" of the West, Buddhism is "nonspeculative [and] scientific ... [The Buddha] may be compared to ... Copernicus or Galileo, Newton or Harvey, in physical science ... Buddhism extends the natural laws, the laws of causality to the mental or psychic domain, or, more exactly, perceives their operation in this sphere, and thereby disposes of the idea of supernatural or transcendental agencies working independent of or in contravention to the natural laws of the universe." ("Buddhism and Science," 45, 47f). Such claims were first forwarded in the late nineteenth century by figures such as Anagarika Dharmapala (1864–1933), a Buddhist reformer from Ceylon and a representative at the World's Parliament of Religions in Chicago, 1893. In his address to the Parliament, he claimed that the Buddha accepted the "doctrine of evolution" and the "law of cause and effect" (1965, 9). Here he drew upon the *sine qua non* of scientific

investigation, causality, and the revolutionary theory of Darwin, claiming them, in effect, for Buddhism. Soen Shaku (1859–1919), a Japanese Zen monk at the Parliament, also claimed that in his doctrine of causality and on many other points, "Buddha's teachings are in exact agreement with the doctrines of modern science." (1993, 122). Both of these important figures assimilated the Buddhist doctrine that all things come about through the complex operation of causes and conditions, dependent origination, and the law of karma to modern conceptions of causality, and the traditional doctrine of karmic connections between species in the cycle of life, death, and rebirth to the theory of evolution.

Paul Carus (1852–1919), a German-American Buddhist enthusiast and prolific writer, also saw Buddhism as scientific in spirit, emphasizing passages in Buddhist scriptures that exhorted disciples to be "lamps unto yourselves," not blindly believing but verifying the Buddha's statements experientially. He saw Buddhism as possibly the best representative of a universal religion latent in all traditions that would manifest in its full flowering sometime in the future. He called this ideal religion the "religion of science." Buddhism, he claimed, was perhaps the historical tradition that so far best manifests this religion of the future, since it "is a religion which knows of no supernatural revelation, and proclaims doctrines that require no other argument then the 'come and see'. The Buddha bases his religion solely upon man's knowledge of the nature of things, upon provable truth." (1915, xiii). All of these authors, and virtually all Buddhist modernists that have succeeded them, emphasize the passage in the Kalama Sutta where the Buddha exhorts his disciples not to believe a teaching because of tradition, scripture, or devotion to a teacher, but to test the ideas for themselves; an admonition widely interpreted today as exemplifying a scientific or empiricist spirit.[4]

This modern reconfiguration of the elements of Buddhism that could be seen in a scientific light was an important part of a number of indigenous modernization movements that "Protestantized" Buddhism, rejecting "superstitious" elements and adopting the languages of Western modernity to describe their traditions not only to the West but to their own nations.[5] It stressed the authority of individual experience, was suspicious of clerical authority, emphasized classical texts, and rejected image-worship and magic. Interpreting Buddhism as aligned with modern science turned out to be quite successfully adaptive: today, as well as a century ago, Buddhism is widely considered to be compatible with the scientific worldview. There is today, in fact, a considerable literature, both popular and scholarly, that

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[4] For a fuller discussion of these figures and their significance to the scientific interpretation of Buddhism, see McMahan: 2004b.

[5] For a discussion of "Protestant Buddhism," see Gombrich and Obeyesekere: 1988.

treats Buddhism as a rational, empirical, and even scientific approach to the world. The favorable image that Buddhism enjoys in the West as a religion largely free of superstition and irrational belief, and in basic harmony with science, comes in part from this early presentation of the rationalistic elements of Buddhism in ways that resonated with the scientific rationalism of the West.

This approach, however, has entailed costs, and it has arguably done some of what I have called ideological violence to Buddhism. In order to maintain the representation of Buddhism as compatible with science, this approach has had to distance itself considerably from Buddhism as it is widely practiced on the ground in Buddhist countries, where it, like all religions, contains many decidedly non-scientific elements. Modernized Buddhism locates the "essence" of Buddhism in its texts and philosophical doctrines rather than in the lives of ordinary Buddhists. The encounter of Buddhism with modernity, and the adoption of a model of Buddhism that resonates with Western rationalism, serves to marginalize the ritual, devotional, and "superstitious" elements of the tradition that many typical Buddhists would consider central to their practice. Considerable historical and anthropological evidence suggests that these elements of Buddhism have always existed in tandem with serious philosophical inquiry and that the severing of the two is largely a result of modernization and Westernization.[6] I will not take the space to discuss the degree to which this poses a problem: some may believe that in fact the falling away of devotion, ritual, and superstition is inevitable and entirely proper to the times. Others would see this as a kind of ideological colonization of the rich variety of Buddhist cultures by a homogenizing modernist version that has adopted western epistemic premises which it now attempts to impose on the rest of the Buddhist world.

3 *Placing Buddhism between Scientific Rationalism and Christianity*

Another important element of the presentation of Buddhism as compatible with science – or even as a kind of science itself – is that it has involved an attempt simultaneously to adopt, amalgamate, and supersede Christian doctrine. For example, in his early twentieth-century lectures to American audiences, Soen takes an equivocal stance toward Christianity, sometimes trying to assimilate it to Buddhism, assuring his audience that Buddhism and Christianity are in basic doctrinal harmony, and other times asserting the superiority of some aspect of Buddhism over its Christian counterpart.

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[6] For discussions of this issue in Tibetan, Indian, and Zen Buddhism respectively, see Dreyfus: 2003; Schopen: 1996; Williams: 2005.

In a lecture entitled "The God-Concept of Buddhism," he is careful to assure his audience that Buddhism "is not atheistic," and that it "certainly has a God, the highest reality and truth, through which and in which this universe exists." (Soen Shaku: 1993, 25) Adopting Western metaphysical language, he identifies Buddhism as a kind of "panentheism," insisting that from the Buddhist perspective God is not separate from the world and paraphrasing biblical quotations that lend themselves to a non-dualistic interpretation: we are made in God's likeness, Soen insists, and "God is in us and we in him." (29) Soen also appears to draw upon Hegelian terminology, identifying deity or ultimate reality as "universal reason" or "original reason." In reaching for a Buddhist equivalent of the concept of God, Soen finds it variously in *dharmakaya*, the cosmic aspect of the Buddha; *sunyata*, the lack of inherent existence in phenomena; and *nirvana*, the state transcending suffering and rebirth in the phenomenal world. He sees these as corresponding to the concept of "Godhead," noting their similarity to the Johannine concept of God (47 f).

Although he insists on the existence of God in Buddhism, Soen dismisses anthropomorphic images of deity through a kind of satirical realism calibrated to resonate with the modernist Christian, Transcendentalist, and rationalist skeptic alike:

> Buddhists do not think that God has any special abode, that his administration of the universe comes from a certain fixed center or headquarters, where he sits in his august throne surrounded by angels and archangels and saints and pious spirits who have been admitted there through his grace ... . [I]f we want to see him face to face, we are able to find him in the lilies of the field, in the fowls of the air, in the murmuring mountain stream ... . (48)

Similarly, in a lecture on immortality, Soen makes only veiled references to the central Buddhist doctrine of rebirth and essentially denies continuing personal existence after death, claiming rather that all beings survive as a "manifestation of the Great All" (58). He also insists that "immortality of work or deed or thought or sentiment" is more spiritually satisfying than naïve notions of personal immortality, and moreover "more in accordance with the result of modern scientific investigation" (59). Soen also asserts that Buddhism is in harmony with natural science in its presentation of life as governed by inexorable laws of cause and effect, in contrast to Christianity's reliance on the miraculous (122).

Soen, as well as Dharmapala and other apologists of the scientific interpretation of Buddhism, illustrates that it is possible to align Buddhism with science and rationalism, but that this involves selectivity and, in some cases, significant re-interpretation of doctrine. Contrary to their claims, Buddhist scriptures in fact *do* contain plenty of miracle stories, mythical cosmologies, heavens and hells, and supernatural beings. There exist, how-

ever, elements of Buddhism that are rigorously analytical and rationalistic, and these are the elements that come forward in the initial encounters with modernity. Their significance may be altered considerably, though: the doctrine of karma must be stretched significantly to be connected with the theory of evolution or Enlightenment notions of natural law, as Dharmapala and Soen claimed it was; nor is the doctrine of dependent origination (*pratitya-samutpada*) and causality in its original context identical with modern scientific notions of causation – rather, these ideas are augmented and re-configured to occupy a new niche within the discourses of modernity. In his de-emphasis on rebirth as well, Soen de-mythologizes his own tradition and then presents it as more scientific than a decidedly non-demythologized Christianity with heavens and angels.[7]

Soen's assertions also illustrate the degree to which the representation of Buddhism as scientific was inextricably intertwined with its stance in relation to Christianity, particularly of its more traditional forms. While it adopted certain aspects of liberal Christianity, this rationalistic presentation of Buddhism was also a point-by-point negation of elements of Christianity that nineteenth- and twentieth-century skeptics questioned. Soen and Dharmapala repeatedly give to Buddhism the favored position over traditional Christianity vis-a-vis modern rationalism: Buddhism has no personal god; it presents a universe run by natural law and cause and effect rather than the capricious dictates of a creator; its founder encouraged skeptical questioning and experimentation rather than blind faith; it anticipated recent psychological discoveries in the West rather than embracing simplistic theories of an immaterial soul; its ideas of karma, rebirth, and the continuity of species anticipate, rather than clash with, evolutionary theory; it has no divine incarnation, special revelation, or miracles. In this view, Buddhism becomes, in effect, an inverse reflection of what skeptics and liberal Christians believed to be problematic about orthodox interpretations of Christianity in light of scientific developments and biblical criticism.[8] The extraction of "science-friendly" elements of Buddhism from its broader cultural contexts allowed Buddhists and Buddhist sympathizers to stake out a particular ground among the discourses of modernity, one that aligned itself with the scientific views of the time against the traditional

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[7] Rudolf Bultmann was the Christian theologian who coined the term "demythologization" and applied it as a hermeneutic for interpreting Christianity. For a discussion of the relevance of demythologization to Buddhism, see McMahan: 2004a.

[8] The hostility toward conservative, evangelical forms of Christianity, it is worth noting, was not merely a matter of intellectual squabbling for some. For example, the Buddhist revitalization movement in Ceylon, in which Dharmapala was deeply engaged, was in part a response to its colonization by European powers. Proponents saw evangelical missionaries and colonial powers as essentially identical, and their reconstitution of Buddhism along rationalist lines was part of a national political struggle.

Christian ones and promised a kind of spiritual orientation in step with modern understandings of the world.

4 Meditation as an Internal Science and a Correction to Scientific Materialism

There is another important aspect of the Buddhist engagement with scientific rationalism: not only did it attempt to position Buddhism to supersede conservative Christianity as a rational religion in the modern world, it also attempted to supersede scientific rationalism itself. Proponents of the scientific interpretation of Buddhism did not just present the tradition as the rational answer to a supposedly irrational Christianity; they presented it as the humanizing answer to an overly rationalistic and materialistic Western culture. While they asserted that Buddhism was in harmony with science, they often expressed dissatisfaction with the de-humanizing, mechanistic, and instrumentalist approach to science common in the Victorian era. Thus, while Paul Carus called the Buddha the world's "first positivist," Westerners and modernizing Asian Buddhists were often decidedly ill-at-ease with positivistic science, which asserted that everything could be explained according to somewhat narrowly scientific notions. Scientific writing of this period often assumed a rather triumphalist tone: science was not just a sure means to knowledge of the natural world, it was the means by which the human race would progress into happiness, harmony, and prosperity. Many Buddhist modernizers were uncomfortable with these rather overblown claims for science. This discomfort turned to skepticism as the twentieth century manifested the darker implications of the explosion in scientific knowledge – the machinery of mass slaughter, massive environmental destruction, and an increasingly mechanized vision of human beings and nature. Buddhists and Buddhist sympathizers, particularly as these more sinister products of scientific rationalism unfolded throughout the twentieth century, saw Buddhism as representing the possibility for the revaluation of science itself.

The hopes for a rehumanization of science and its uses have centered not only on Buddhist philosophical discourse but also on another element of Buddhism crucial to modern epistemological discussion: that of meditation. Today meditation is often considered virtually synonymous with Buddhism. In actuality, historical and ethnographic evidence suggests that only a small minority of specialist monks and even a smaller minority of laypeople have taken up serious meditation practice. It does occupy an important symbolic place in the tradition, but this position does not account for the recent revival of meditation, not only among monastics of various traditions but also of laity. Lay practice of meditation was rare until revi-

talization movements in Ceylon, Japan, and various countries in Southeast Asia began promoting meditation widely and setting up centers where lay Buddhists could learn and practice mindfulness techniques adopted from classical Buddhist texts. Teachers who developed this new laicized approach to meditation, like Mahasi Sayadaw and various Zen teachers from Japan, were very influential in the West, as well as in their own lands. They established an approach to meditation that, as it spread throughout the world in the late twentieth century, became more and more independent from the Buddhist institutional, cosmological, social, and ethical contexts in which the practice was once situated. Now Buddhist meditation has achieved a life of its own, not just in the monastery but in psychologists' offices, churches, hospitals, prisons, and private living rooms (Sharf: 1995).

Meditation has intersected with scientific discourse in two overlapping ways. First, scientists in recent decades have subjected meditation to empirical studies such as those in which meditators' brains are scanned in MRI machines to determine how the practice affects various brain functions (Davidson and Harrington: 2001; Wallace: 2007). Second, meditation has come to be described as itself a kind of scientific technique. This draws on the rather widespread epistemic assertion I quoted above, that Buddhism (i.e. meditation) studies "natural law" or the "law of causality" as they operate in the psyche. Buddhist meditation is presented as an *interior science* parallel to – and in some ways superseding – empirical science, one that not only brings peace of mind and greater awareness but also aspires to verifiable knowledge. This interpretation goes back at least to Dharmapala and continues in current literature. Contemporary scholar and dharma teacher B. Alan Wallace, for instance, asserts that "Buddhism, like science ... posits a wide array of testable hypotheses and theories concerning the nature of the mind and its relation to the physical environment. These theories have allegedly been tested and experientially confirmed numerous times over the past twenty-five hundred years, by means of duplicable meditative techniques." (2003, 8). He characterizes advanced meditators as investigators performing repeatable experiments, making "discoveries ... based on firsthand experience," then subjecting them to "peer review by their fellow contemplatives, who may debate the merits or defects of the reported findings" (9).

Moreover, the interior science of meditation, according to this interpretation, can serve as a corrective to the excessive rationalism, materialism, and reductionism of mainstream science. It not only has just as sophisticated a scientific psychology as any in the West, it also has something Western science has lost in its drive to reduce all phenomena to measurable data: a way to a more direct, intuitive, experiential apprehension of things, particularly things of the mind. Contemporary iterations of this argument often take aim at the increasingly sophisticated materialist models for understanding consciousness. Robert Thurman (1991, 57–61), for example, criticizes con-

temporary neuroscience, which views consciousness in strictly physicalistic terms, offering Buddhist meditation as a counterbalance. In contrast to Western psychology's increasing emphasis on the "hardware" of the mind, he sees Tibetan Buddhist psychology, and meditation in particular, as an "inner science" with "sophisticated methods of software analysis and modification [that] can help with the individual's inner reprogramming .... There is a vast array of mental technologies, modification techniques that enable individuals to incorporate and integrate the improved software" (64). This inner science is not only another avenue of exploration that can increase scientific knowledge, it is also a correction to the Western "dogmatism" of "scientific materialism" (59). Thurman admits that the materialist approach of the sciences has helped humanity develop an excellent understanding of the environment, cured diseases, and improved life for some, but it has also produced unprecedented means of self-destruction. Western science in fact has taken a wrong turn in that "our powers to effect the outer reality have outstripped our powers over ourselves" (56). Many contemporary Buddhists, including Buddhist scientists, hope that Buddhist contemplative methods can introduce into scientific disciplines a more balanced, humanizing view of the mind, over against the strictly materialist view of contemporary science. The threat of nihilism attendant on the strictly physicalist view of mind and world often lurks in such discussions, as well the implication that this view is in part responsible for much of the social, geopolitical, and environmental problems the modern world faces (Varela et al.: 1991).

Whether claims about the scientificity of meditation are convincing or not, what is important to my argument is to see how they reconstitute Buddhist epistemology in terms of modern science and position it in a space that both embraces basic scientific principles and yet hopes to offer a new approach to science, one that might ameliorate some of the negative consequences of scientific materialism. It is also important to see that this critique of scientific materialism does not derive straight from Buddhism itself. The establishing of modern Buddhist positions in relation to science obviously has no precedent in pre-modern Buddhist thought: there simply was no Enlightenment rationalism, industrial revolution, positivism, atom bomb, or environmental crisis in relation to which a Buddhist position could be established in ancient India or medieval China. The Buddhist embrace and critique of scientific rationalism is a unique hybrid product of its encounter with modernity.

5 *Buddho-Romantic Approaches to Knowledge*

This is not the end of the story, however. If Buddhist modernism allied itself with scientific rationalism to critique conservative Christianity, it also drew from another Western tradition to critique scientific rational-

ism: Romanticism. Romanticism in its various forms has been, since the eighteenth century, a counterbalance to the powerful discourse of scientific rationalism. It was also important in the creation of a modern Buddhist epistemological stance. Romanticism saw human beings as constituted by inner depths, profound feelings, imagination, and intuitive connections with nature, spirit, or God. While they did not reject science, Romantics were often suspicious of Enlightenment rationalism, narrow scientism, and the dominance of instrumental reason. They envisioned nature as a living, organic system, a force animating all beings in a vast interconnected world, as opposed to the Enlightenment's mechanistic universe. Wordsworth's "Lines Composed above Tintern Abbey" famously illustrates the idea:

> And I have felt
> A presence that disturbs me with the joy
> Of elevated thoughts, a sense sublime
> Of something deeply interfused,
> Whose dwelling is the light of setting suns,
> And the round ocean, and the living air,
> And the blue sky, and in the mind of man –
> A motion and a spirit that impels
> All thinking things, all objects of all thought,
> And rolls through all things. (2000, 132f).

Romantics invited another way to envision knowledge: they asserted in various ways that through introspection and self-examination, one could discern this presence of nature or the divine from within. This would not give empirical data needed to make scientific conclusions but could yield a kind of knowledge even more valuable: knowledge of the whole, of the primal spirit of things, the life of the cosmos and of humanity – of that mystery that is "deeply interfused." Emerson, who adapted European Romanticism to America, asserted that, since visible nature is the manifestation of spirit, one who could attune the understanding to the visible forms of nature could have "access to the entire mind of the Creator" (Albanese: 1988, 70f). Such discernment could also be a source of morality. Rousseau (1911, 56) declared that "the first impulses of nature are always right." This means that, while we may be conditioned by society to follow its rules, true morality comes from within and may well transgress convention. The interior depths of the individual, for the Romantics, were also the source of creativity. Artists conjure up from the depths of their being their own unique visions of the infinity within.

Although the eras of Romanticism and Transcendentalism have passed, many of their themes live on, having become infused into the broader culture of the West. Ideas of each person having a deeper interior, a true self within that is not identical to one's social roles, for example, is a prominent theme not just in contemporary eclectic spiritualities but in some schools of

psychology, literature, and various facets of popular culture. Notions of the source of creativity, morality, and personal authenticity as located in the inner depths of the individual constitute an important part of the vocabularies of selfhood that still have considerable currency today.

Modernizing forms of Buddhism were often translated into these vocabularies inaugurated by Romanticism and Transcendentalism. For example, one of the most influential modernizers, D.T. Suzuki, articulates themes from Zen literature in Romantic-Transcendentalist language that has directly to do with this interior focus and its epistemological implications. In an essay on the relationship between humanity and nature, he characterizes the Western view of this relationship as one of alienation. Western religion, he says, admonishes humanity to dominate nature and sees the *natural* in opposition to the *spiritual*; one is asked to subdue the body and the natural impulses. Modern secularism and materialism in turn compel humanity to master and control nature, to dominate and subdue it through technology. Nature, however, cannot ultimately be subdued: everything eventually succumbs to its laws and to the inexorable destructive momentum of time. Both the Western religious and secular views, says Suzuki (1956, 229–233), render modern humanity susceptible to anxiety, frustration, fear, and insecurity.

He offers Zen as an antidote to this alienation from nature. Zen, he claims, sees humanity not as separate from nature but as one with it. And, most pertinent to our theme of knowledge, he suggests that Zen offers a way to realize this state of oneness, which is prior to the division of subject and object and "totally identified with Nature." While self-identity is not annihilated in this state, knowledge of things is not refracted through the ego but is experienced directly (250).

What implications do such assertions have regarding the boundaries of knowledge? The epistemic contention here is that it is possible to know the whole of things, the underlying principle of things, or the inner life of things through direct acquaintance – or, more than acquaintance, *identification* with them individually as well as identification with the whole of things. I don't think Suzuki is suggesting here that one who has such an experience would know the number of grains of sand in the Ganges (though some ancient texts do make such extravagant epistemological claims for a Buddha); nevertheless, he does assert that this is a kind of knowledge that surpasses all empirical, scientifically acquired knowledge, one that calls into question the boundaries of knowledge established in scientific discourse.

Such claims resonate profoundly with those of the Romantics, and it is this resonance that allowed another avenue by which Buddhism could engage with modernity and Western culture. The early nineteenth-century German Idealist philosopher Friedrich W.J. Schelling, for example, put forth a metaphysic in which objects are not independent of the subject, though the usual immersion of the ego in objects blinds the subject

to their primordial intertwining. Moreover, because subject and object are not ontologically separate, human beings can come to know nature in a unified sense, not through empirical judgments but through an "inner love and familiarity of your own mind with nature's liveliness ... [and] a quiet, deep-reaching composure of the mind." (Schelling: 1856–61, vol. 7, 62). It is through what he calls "intellectual intuition" that the subject recognizes its own ultimate identity with objects. Restoring this lost communion between the self and the world is what constitutes true happiness and overcomes the "fall," which is the arising of opposition and differentiation out of the primordial unity of the spirit. All human beings are ultimately one, he says, though on the empirical level they appear as many. The infinite absolute, however, is ineffable and beyond all distinctions.

These ideas cannot help but ring familiar to those acquainted with modern expressions of Buddhism, particularly Zen. And this is no coincidence, for Suzuki and others borrowed terminology, if not from Schelling himself, then from his successors, especially the Transcendentalists. These ideas deeply informed the language into which Buddhist concepts were translated in the West and helped Buddhists and Buddhist sympathizers construct another line of epistemological thought drawing upon the accumulated weight of a Western tradition that emphasized inwardness, embraced science in general but criticized a mechanistic and scientistic view of life, and gave epistemic value to internal probing and analysis of thought and feeling.

6 *Adaptation and Challenge*

In its engagement with modernity, therefore, Buddhism infused itself into the tensions between scientific rationalism, Romanticism, and Christianity, drawing upon the languages of each in order to articulate its own epistemological claims reformulated for the modern world. Some authors emphasized the rationalistic, analytic side of Buddhism, which could resonate with modern scientific discourse and challenge conservative Christianity in the search for rational religion. Others emphasized the meditative and inward elements, which could resonate with Romanticism and Christian mysticism. If we can summarize in broad generalizations the epistemic position that it has come to take in relation to these discourses, it would be this: Buddhist modernism draws from all three of these discourses, adopting rationalistic, Christian, and Romantic elements; yet it aligns itself with scientific rationalism over against conservative forms of Christianity and borrows from its more liberal forms; but it is also critical of positivistic and scientistic modes of scientific rationalism; and in articulating this critique it draws on the Romantic-Transcendentalist cosmology, as well as this tradition's stress on the epistemic value of interior experience.

The question of the boundaries of knowledge as conceived in modern Buddhism, therefore, yields a complicated answer. On one hand, we find the assertion of an epistemic resonance between scientific rationalism and Buddhism. The limits of empirical knowledge, many Buddhists are content to say, are those that science claims. Yet, on the other hand, they widely assert that there is a kind of interior knowledge that surpasses the empirical. Buddhists have often articulated this point drawing from the languages of Romanticism and Transcendentalism, as in Suzuki's knowing through identification with the object of knowledge, or in scientific language, as in Wallace's characterization of Buddhist meditation as an interior science.

Perhaps this kind of historical analysis, though, is frustrating to those asking the simple question (and one that has often been asked): Is Buddhism, in fact, compatible with science, or more broadly, with contemporary epistemological axioms? The question assumes that there is some essential, ahistorical "thing" called Buddhism. However, Buddhism is so vast and complex – spanning two and a half millennia, adapting to dozens of languages and cultures, and containing a plethora of different schools and doctrines – that a historian of religion like myself must ask the question differently. Let's try it this way: Are there elements of Buddhism that, when taken up in the context of modern science and developed and adapted along the lines of scientific thinking, *become* compatible with science? Clearly yes. This "taking up" of selected elements of a tradition in the context of another tradition is how religions develop, adapt, change, and come to occupy an ideological niche different from the one in which they initially evolved. And the ways that Buddhism has been taken up and developed in the context of three constitutive discourses of modernity – scientific rationalism, Romanticism, and Christianity – have created a new Buddhism, a hybrid Buddhism with the capacity to be compatible with, as well as critical of, all three discourses by the very fact of its being thus taken up.

Despite its survival value, though, there is again a loss in such adaptation. In the adaptive shedding of ideas and practices that are less compatible with modernity – in this case, modern epistemology – Buddhism (or any tradition) may lose a great deal of its diversity. This may include "popular" elements as well as philosophical components that might provide interesting and valuable challenges to the dominant epistemic paradigms of modernity. Too much adaptation and accommodation may in fact blur the distinctions between the epistemic claims of Buddhism and those of current Western traditions, rendering Buddhism impotent to offer anything new to the conversation. The limits of knowledge in Buddhism then become virtually identical to those in whatever Western philosophies and theologies with which Buddhism assimilates. It this respects it runs the risk of losing any distinctiveness, becoming yet another iteration of the epistemic axioms of modernity. Yet historically Buddhism has proven extremely flexible not

only in adapting to new cultures but also in creating and contributing novel elements to and within those cultures. It has not only adapted to but also transformed cultures. A modern Japanese Zen master is said to have once responded to an inquiry about Zen penetrating Western culture by saying, "The first five hundred years are the hardest." Perhaps it is therefore too early to say exactly what the Buddhist contribution to modern epistemological conversation will ultimately be.

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Chapter 4
Shinran and Heidegger on Truth

Dennis Hirota

1 Introduction

This chapter will focus on the Japanese Shin Buddhist tradition (Jodo Shinshu) stemming from the medieval religious thinker and leader Shinran (1173–1263). Shin Buddhism arose as a development of the Pure Land Buddhist tradition transmitted to Japan from India across the Asian continent. I will suggest a possible avenue toward developing a view of the nature and significance of modern scientific knowledge from a Shin Buddhist perspective by taking up the conception of truth in Shinran's thought. I will attempt this in three steps. First, I will outline several characteristics of Shinran's conception of truth. Second, in order to clarify Shinran's conception of truth, I will attempt to bring it into a broad comparative framework with certain aspects of the thinking of Martin Heidegger. Third, I will touch briefly on the question of whether, and in what ways – given certain similarities in conceptions of truth – Heidegger's understanding of modern science and technology might provide hints for a perspective on the natural sciences rooted in Shinran's thought.

There are two reasons for the comparative approach involving Heidegger. First, it may serve as a corrective (or antidote) to the prevailing Western academic views of Shin Buddhist tradition, which have characterized it as a "simple doctrine of salvation through faith" (Dobbins: 1989, 2). A number of parallels may be drawn between Shinran's thought and Heidegger's attempt to dismantle the reified subject-object dichotomy underlying commonsense notions of truth as correspondence. Such a deconstruction clearly undermines the conception of faith as doctrinal belief that underpins the accepted view of Shin in Western religious studies.

Second, comparison with Heidegger's exploration of the nature of truth may provide a means for loosening aspects of Shinran's teaching from their moorings in a primarily soteriological framework. In this way, it may be possible to bring his thought toward an engagement with knowledge of the world, including that of the modern sciences.

I will begin with a brief consideration of Shin tradition and Shinran's conception of truth.

2 *Shin Buddhist Tradition*

Although Shin Buddhism has had an institutional presence in North America for more than a century, and although it is one of the largest Buddhist movements in the world, with over 20,000 temples in Japan, it has attracted little interest among Western scholars of Buddhist studies and religious studies. The basic reason for this has perhaps been expressed most acutely, though indirectly, by Karl Barth in *Church Dogmatics*. Surveying world religions, Barth finds Shin to be "the most adequate and comprehensive and illuminating heathen parallel to Christianity" (1961, 342). The obstacle to interest among Western scholars of religion is not, of course, that Shin is "heathen," but rather that it shares with Protestant Christianity a number of apparent similarities in central concepts and doctrinal structure. Since Barth's checklist of analogues may provide a handy overview of Shin Buddhism, I will mention it here: "more or less explicit structure as the religion of grace," "Reformation doctrines of original sin, representative satisfaction, justification by faith alone, the gift of the Holy Ghost and thankfulness" (ibid.). In Shin Buddhist terms, the parallels might be expressed as follows:

(1) Structure of "grace": Amida, the Buddha of light and life (wisdom-compassion), works to lead all beings out of the painful existence of ignorance to liberation and awakening, regardless of their moral condition or capacities for learning or religious praxis. To this end, he has established and fulfilled his Primal Vow to bring into the field of his own awakening (Pure Land) all beings who simply say his Name, *Namu-amida-butsu*, in trust. Both the Name and the saying of it are termed *Nembutsu*.

(2) "Sin": Human beings, as "foolish beings," are ineluctably possessed of egocentric blind passions and ignorance, which have led to meaningless repetition of samsaric existence for unknowable aeons.

(3) "Representative satisfaction": Amida Buddha, as a bodhisattva, performed practices and amassed virtues for innumerable aeons in order to fulfill his Vow by directing those virtues toward the enlightenment of all beings.

(4) "Faith": Beings, because of their blind passions, are incapable of advancing themselves toward enlightenment or Buddhahood through any act of goodness or practice, but if they realize *shinjin* (the entrusting of themselves to Amida's Vow) and say the Name (*Nembutsu*), they will be born in Amida's Pure Land and attain perfect enlightenment. Shinran states, "The truly decisive cause [of attainment] is *shinjin*" (Hirota et al.: 1997, 72). Upon realization of birth in the Pure Land and enlightenment, they will return at once to realms of samsara in the compassionate work of guiding others to enlightenment.

(5) "Gift," "thankfulness": *Shinjin* is itself the mind or wisdom-compassion of Amida Buddha given to beings through Amida's activity. Beings

realize the Buddha's mind in the form of *shinjin*, and their utterance of the Name arises from the Buddha's mind in them, not their own blind passions. Thus, the Name of Amida, *shinjin*, and the attainment of enlightenment are all given through the working of Amida's Vow. In spontaneous response to this gift, beings of *shinjin* say the Name out of gratitude.

Although I do not wish to reinforce the typical views that have dominated Western attitudes toward Shin, in order to move more directly to the theme of the present volume, I will suggest one further parallel with particular strains within Protestant Christian tradition, perhaps based on those similarities already mentioned. Shin may be said to share something of Barth's resistance to the impulses and assumptions of a natural theology. Lutheran tradition has been characterized as taking "a high view of nature, but a low view of disengaged reasoning," and as highly critical of a "self-centered trust in the capacities of human reasoning in grasping God." (Gregersen: 2003, 127f). As deducible from the brief outline of Shinran's thought above, he displays a close accord with this critical strain of Lutheran thought and therefore attributes no religious significance to knowledge about the world. Though he borrows from his period the devolutionary view of the cosmos associated with the "last dharma-age," even in this, he makes little of any "objective" verification of the teaching based on knowledge about the world. There is no notion of divine creation of the world to support religious motivation for a natural science, and ideas like the working of karma are true only when genuinely apprehended. As abstract principles intellectually adopted, they are likely to be utilized to bolster the delusive self.

3 Shinran's Conception of Truth

I will first sketch some of the most basic characteristics of Shinran's conception of truth and then consider how Heidegger's thought might illuminate its structures.[1]

To begin, in Shinran's writings, the basic terms corresponding to "true" or "truth" (*shinjitsu, makoto*) must be taken fundamentally as synonyms for real or reality and all related traditional Buddhist expressions: suchness, thusness, oneness, dharma-body, buddha-nature, wisdom, and so on.[2] At

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[1] For a more detailed treatment of Shinran's conceptions of truth and language, see Hirota: 2006.

[2] Of course, there are other terms, primarily from the Chinese translations of Buddhist texts, that are normally translated "truth," for example, *tai*, which is used for the Four Noble Truths (*satya*) and the twofold truth, worldly or conventional truth (*samvrti-satya, zokutai*) and supreme truth (*paramartha-satya, shintai*), and *dori* or *kotowari*, which is often translated "principle." When Shinran refers to the truth of the Larger Sutra or asserts that the *Nembutsu*

a fundamental level, therefore, truth for Shinran is not primarily propositional. It does not most basically refer to assertions about the world or representations of the things or facts we encounter. Rather, truth is reality itself. In other words, it is precisely things freed of the imposition of conceptualization and verbalization.

At the same time, however, truth for Shinran *does* stand in relation to human understanding and *does* take the form of words. It may be said to emerge in the realm of human apprehension and become manifest. We may get a sense of his notion of truth by looking at the method by which he demonstrates the "truth and reality" (*shinjitsu*) of the teaching of the Larger Sutra of the Buddha of Immeasurable Life in The Collection of Passages on the True Teaching, Practice, and Realization of the Pure Land Way.

In the first chapter of this work, "Chapter on Teaching," Shinran asserts that the truth of the *sutra* is evident from the circumstances in which it was delivered by Shakyamuni Buddha. That is, as may be ascertained from the dialogue between Shakyamuni and his disciple Ananda that frames the teaching of the *sutra* proper, just prior to his expounding the *sutra* Shakyamuni has emerged from profound *samadhi* (called "the *samadhi* of great tranquility" in one translation), and his countenance and physical features hold a splendor and radiance that reflect the depth of his meditation. From the Buddha's extraordinary appearance, it is clear to his disciple that the *sutra* he is about to preach will be not merely one version of the teaching among many, but the very teaching that Shakyamuni has expressly appeared in our world in order to deliver. Shinran's argument turns on the following passage, which he adduces in the first quotation of Teaching, Practice, and Realization:

> How is it known that [this *sutra*] was the great matter for which Shakyamuni appeared in the world? The *Larger Sutra* states:
> [Ananda asked,] "Today, World-honored one, your sense organs are filled with gladness and serenity. Your complexion is pure. Your radiant countenance is majestic ... . Today, the World-honored one abides in the dharma most rare and wondrous. Today, the Great Hero abides where all Buddhas abide ... . Today, the Preeminent one of the world abides in the supreme enlightenment. Today, the Heaven-honored one puts into practice the virtue of all Tathagatas ... . Why does your commanding radiance shine forth with such brilliance?" ("Chapter on Teaching," section 3; Hirota et al.: 1997, 7f).

This passage forms the core of Shinran's proof of the truth of the *sutra*. The words that Shakyamuni delivers are known to be true not because they do indeed teach accurately about the nature of the world or because what they assert represents the actual state of things, but because the words have

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teaching is true, however, he uses the term *shinjitsu* or the Japanese reading of each of the two characters that make up this term, *makoto*.

emerged from the deepest *samadhi*, which is itself true reality – the "dharma most rare and wondrous" or the "abode of all buddhas." Because of this, the Buddha's exposition manifests in words the reality beyond verbal expression and conceptualization.

Truth in Shinran's thinking, therefore, is not determined through judgment based on a criterion of correspondence or coherence. It may seem to be foundationalist in that its veracity rests on the realization of the Buddha, but we must note that there is a critical rift between the reality realized by the Buddha, which transcends words and concepts, and the verbal expression of the teaching, so that logical, methodical erection of a superstructure of doctrine upon an unshakable foundation of truth is impossible.

Further, it may be noted that this conception of truth does not rest simply on the authority of the Buddha. Thus, Shinran can assert: "If Amida's Primal Vow is true, Shakyamuni's teaching cannot be false. If the Buddha's teaching is true, Shan-tao's commentaries cannot be false. If Shan-tao's commentaries are true, can Honen's words be lies? If Honen's words are true, then surely what I say cannot be empty." (Tannisho, 2; Hirota: 1982, 23; also, Hirota et al.: 1997, 662). This is surely a line of logic or reasoning that at bottom turns upside down our usual expectations. According to this passage, the truth of Amida's Vow is not demonstrated on the basis of the Buddha's teaching, but in fact precisely the reverse – the teaching is true because of the Vow.

Shinran also states this same basic view of truth or reality as prior to its verbal expression or manifestation in the form of the teaching from the reverse perspective: "After true shinjin has become settled in us, even if Buddhas like Amida or like Shakyamuni should fill the skies and proclaim that Shakyamuni's teaching and Amida's Primal Vow are false, we will not have even one moment of doubt." (Letters of the Tradition, 2; Hirota et al.: 1997, 575). Again, the truth of the Vow is not demonstrated by the authority of the teaching. Rather, it is truth itself as occurrence or event of its emergence that provides the touchstone by which verbal expressions may be judged.

We may note further, then, that in Shinran's thought truth stands distinct from the character of our ordinary modes of knowing and reflection. Thus he states: "'True and real' (*shinjitsu*) refers to the Vow of the Tathagata being true and real; this is what the term *sincere mind* [in the Eighteenth Vow] means. From the very beginning sentient beings, who are filled with blind passions, lack a mind true and real, a heart of purity, for they are possessed of defilements, evil, and wrong views." (Notes on the Inscriptions on Sacred Scrolls; Hirota et al.: 1997, 493).

It is not simply that human thought and perceptions are limited so that truth does not naturally enter its compass; rather, our vision and awareness are fundamentally askew, warped by delusional self-attachments, and thus in conflict with truth. To probe Shinran's conception of truth further, let us turn to a consideration together with Heidegger.

4 Shinran and Heidegger on Truth

Heidegger contributed importantly to a shift in much of twentieth-century philosophical concern from traditional issues of ontology and epistemology to a notion of philosophy as hermeneutics, in which human awareness is viewed as inherently interpretive. This shift turns on the displacement of the dualism of subject and object as the central paradigm of knowledge and as the foundation of traditional philosophical issues.

Within the diversity of Buddhist traditions, Shinran's thought is particularly close to strains of recent hermeneutical thought. There are two basic reasons for this. First, Shinran's path may be seen as one of the most far-reaching developments of the critical stance that played a formative role in the rise to Mahayana tradition. The early Mahayanists characterized their immediate predecessors in the Buddhist tradition as having lapsed into a false understanding of the goal of practice and into absorption with merely scholastic disputation. In short, according to Mahayana Buddhists, while such practicers had been taught to extinguish all attachments and enter the realm of nirvana or wisdom, many had fallen into attachment to the goal of nirvana itself. Shinran not only inherited this critical, creative stance of the Mahayana movement, but his Buddhist path may be said to constitute precisely that stream of Buddhist tradition that most radically probed the nature of genuine engagement with the teaching and the tenacity of human self-attachment. It is in this context that we must grasp Shinran's analyses of the impulses within religious life toward self-magnification that he terms "self-power" (*jiriki*) and "calculative thinking" (*hakarai*). The parallel orientation in hermeneutical thought may be seen in the recognition of the situatedness of the human subject and the insistence on the contingent and engaged nature of understanding.

The second element of Shin Buddhist thinking that opens it to comparison to recent hermeneutics is that, unlike Buddhist paths that center on meditative or contemplative practices, the Shin Buddhist path is taught to be fulfilled in nonmonastic environments, in the course of everyday life, without the eradication of egocentric perception and emotion. Entanglement in delusional language use is not broken through, and the path is realized precisely within the realm of language, through hearing the teaching and saying the Buddha's Name.

The acknowledgment of human finitude and situatedness in Shinran and in modern hermeneutics, coupled with what may perhaps be called an "existential" concern to articulate the nature and possibilities of awareness from within the limitations of its actual compass, appear to lead to certain structural similarities in thought. I will mention here several motifs of Shinran's thinking regarding a person's engagement with truth, briefly drawing parallels to concepts in Heidegger's essay, "On the Essence of Truth," that

might be seen as lying along the contours of a similar concern and configuration of issues (McNeill: 1998).

Shinran and Heidegger may be said to be in agreement on versions of the following outline:

(1) Truth is commonly considered to be a matter of accord between the representation in verbal statements and what is actually the case, but it is not chiefly a property of propositions or beliefs. There are two basic reasons the commonsense notion must be regarded as inadequate. (2) First, it rests on assumptions of an autonomous subject capable of perception and assessment from a transcendent standpoint, but human awareness must be seen as always and inescapably conditioned and contextualized. (3) Hence, there is no absolute standard available to the subject by which it may render impartial judgments. Indeed, our usual grasp of the world does not arise from a transcendent and objective perspective, but is always colored and shaped in various ways, depending on our interactions within particular circumstances.

(4) The second reason has to do with that which appears in the world around us and becomes accessible to us in our world of speech. Both Shinran and Heidegger pursue the inquiry into truth into questions of how reality appears as intelligible and what enables humans to apprehend it. Both thinkers develop structures involving a complex, reciprocal dynamic of simultaneous engagement and withdrawal (or disclosure and hiddenness) on the sides of both the knower and the real. (5) The major consequence of these structures is that truth or the apprehension of reality must be seen as essentially interfused with untruth.

(6) The apprehension of such truth/untruth is inevitably transformative. (7) It involves a fundamental shift in mode of thinking and perception and hence of the conduct of life, and may be called salvific.

I will discuss the elements of this sketch briefly, drawing on both Shinran and Heidegger. Although the immediate referent of "truth" must be said to be far more restricted in scope in Shinran than in Heidegger, the configurations of their problematic and the structures of their conceptions of apprehension are nevertheless analogous in significant ways.

4.1 Truth Is Not Primarily a Property of Propositions

Neither Shinran nor Heidegger completely denies the commonsense notion of truth as representational correctness or accordance between assertion and fact. Shinran regards the teaching of the Vow of Amida Buddha by Shakyamuni in the Larger Sutra as the basis for the unfolding of the Pure Land path in history, and speaks of it as Shakyamuni's "true words" and "true teaching," and as the "right exposition for which Shakyamuni Bud-

dha appeared in the world." Further, he adduces passages recording the immediate circumstances of Shakyamuni's exposition from the *sutra* itself as providing "clear testimony" of the truth and the epochal significance of the Buddha's message.

Nevertheless, as we have seen, truth for Shinran cannot be regarded fundamentally as proposition or doctrinal proclamation, to be demonstrated through reasoning or accepted on authority and therefore acquiesced to intellectually. This is because such engagement with the teaching is in fact an appropriation rooted in, and thus reinforcing, attachments to a falsely conceived self. In his writings as a whole, Shinran is fundamentally concerned to illuminate what he labels "self-power within [engagement with the path of] Other Power," the clinging that underlies ordinary assumptions regarding what is true and good and the conviction that such determinations are clear, immediately accessible, and easily incorporated into a calculus of personal virtue. He quotes Shakyamuni's words in the Larger Sutra:

> Suppose there are sentient beings who, with minds full of doubts, aspire to be born in that land through the practice of various meritorious acts. Unable to realize Buddha-wisdom, the inconceivable wisdom, ... they doubt these wisdoms and do not entrust themselves. And yet, believing in [the recompense of] evil and good, they aspire to be born in that land through cultivating the root of good. (Chapter on Transformed Buddha-Bodies and Lands; Hirota et al.: 1997, 209).

According to Shinran, the appropriation of Pure Land teachings within ordinary modes of thinking leads not to genuine apprehension (*shinjin*) but to "belief in [the recompense of] evil and good" based on an accessible moral order. Such belief is in fact "doubt" or egocentric calculation (*hakarai*). The encounter with what is true and real occurs only as a transformation of such ordinary thinking and perception.

In "On the Essence of Truth," Heidegger adopts as his starting point the conception of truth as correspondence, but quickly moves on to an analysis of its presuppositions. He points out that the notion of truth as accordance in the modern West goes back "most recently" to medieval origins and is ultimately grounded in the theological idea of correspondence between the created and ideas preconceived in the mind of God, which are also bestowed on humans. In other words, it is mutual conformity to the *intellectus divinus* of both matters in creation and human knowledge that grounds the possibility of truth. In the modern West, the "order of creation" has since given way to a generalized world-order or worldly reason, which is tacitly invoked to explain how correctness may occur and which is presumed to be immediately intelligible and without need of proof. According to Heidegger, this presupposition of an "obvious" order in the world in fact underpins an absolutization of the perceiving self that masks and obstructs the actual dynamic of apprehension.

Thus Heidegger's thinking, just as Shinran's, leads to a rejection of the adequacy of a commonsense notion of truth that assumes both the framework of an order or logic accepted as self-evident together with the autonomy of the ego-subject functioning in accordance with it. Such presuppositions must be overturned for the genuine nature of truth to be apprehended.

4.2 Human Existence Is Conditioned and Finite

Heidegger's method in "On the Essence of Truth" is to press his inquiry into the nature truth by probing how it is possible for there to be accordance between a statement and a matter, between words and particulars, which must be recognized as completely disparate in nature. This leads to the question of the relationship between "presentative statement" and "presented thing," and the meaning of being "present" itself. Heidegger asks what it is that enables things or facts to be present in the first place, to which statements may correspond.

Refusing the familiar notion of a subject-object relationship in which objects simply appear distinctly and directly before a transcendent subject, Heidegger argues that beings are disclosed as the things they are through practical human involvement within a preexisting matrix of meaningful relationships. For Heidegger, a person becomes aware of things only within a contextualizing "world," a prior understanding embodied in language and directed behaviors. It is against a background of such involvements that things emerge as intelligible and significant in the world around us. Heidegger therefore speaks of a person's "comportment" toward things – activity that allows a thing to appear – and of a world, which is not a totality of objects but which serves as a "horizon" within which things appear in a disclosive context. A statement, then, may be seen as an aspect of such comportment. In comportment, a person stands in an "open region" (clearing, openness), which is a "domain of relatedness" in which beings become present as objects opposite the subject and "become capable of being said" (McNeill: 1998, 141). Here, according to Heidegger, being and presentative statement become present together, and it is this that forms the basis for propositional correctness.

Thus, to displace the commonsense model of knowledge based on a substantialist subject-object dualism, Heidegger delineates an experiential structure of knowing in which, from the beginning, human being and contextual world are mutually dependent. Human beings find themselves always already within a world, and things are found to be meaningful only through human interests and involvement. "World" in Heidegger's sense is a dynamic that plays a twofold role. On the one hand, as the conditioned and conditioning "horizon" of intelligibility in which a person carries on his or her existence,

it is the situating of a person socially, culturally, and historically. On the other hand, it is the "presencing" by which beings appear around us as meaningful in the conduct of our lives. "World," then, is a functioning that must be presupposed when considering subject or object – a particular lens that brings into varying degrees of focus and salience specific aspects and features of our surroundings, showing things such-as they may be present to us.

The notion that the always prior situatedness of human beings provides, through concrete practices of daily life, the contours of their grasp of the world resonates with Shinran's emphasis on the karmic conditionedness of a person's existence, stretching back into an unknowable past and informing one's present circumstances, and his marked sense of social, cultural, and historical place and of the linguisticality of human existence. These views suggest that, like Heidegger, Shinran regards human existence as fundamentally conditioned in ways that escape ordinary self-awareness and belie the common assumptions of the self as an autonomous agent capable of detached perceptions and absolute judgments.

Further, by probing the insight into a conditioned directedness or interestedness similar to Heidegger's concept of comportment, Shinran develops the central Pure Land term *shinjin* – traditionally regarding as a person's attitude of faith – as a mode of engagement in which a person's attachments within the realm of his egocentric perceptions is broken. He states that the Vow cannot be genuinely grasped simply as propositional truth, but must be "encountered." The Name of Amida must be "heard." This takes place in "one thought-moment," and can only be "awaited," not in any way brought about by a person's "calculative thinking" or "designs" (*hakarai*). It is "given" by and as the working of Amida's wisdom-compassion. Such expressions, a number of which have their analogue in Heidegger, bespeak a mode of engagement with the teaching in which truth is not primarily a property of doctrinal propositions but an occurrence or event.[3]

4.3 Ordinary Human Existence Is Characterized by Ignorance and Attachment

While the conditioned, contextualized nature of human awareness indicates its finitude for both Shinran and Heidegger, from Shinran's Buddhist perspective, that such human awareness remains intractably discriminative

[3] Heidegger also speaks of "awaiting," and of the pitfalls of calculative thinking. Another significant parallel metaphor in both Heidegger and Japanese Pure Land is the notion of "robbery," which Gadamer takes special note of, or "stealth": "Wakening aspiration for enlightenment is best accomplished by stealth" (Honen, recorded in Plain Words on the Pure Land Way [Hirota: 1989, 43]).

and reifying in its functioning, standing on the dualism of self and other and drawing distinctions among beings from the perspective of the self, points to a fundamental ignorance and source of afflicting passions. Thus, for Shinran, human existence as karmically conditioned is not merely finite but may be characterized as evil in the sense of comprising acts that can lead only to further painful existence and not toward realization of the liberative, nondiscriminative wisdom of buddhas.

Heidegger does not include a dimension like Shinran's conception of karmic evil in delineating human finitude, but in addition to his concept of comportment as a directed involvement in which beings appears as objects of concern to one, he states that comportment is always "attuned" by a disposedness or pervasive mood or tone that enables and characterizes the way a person apprehends the things of the world (McNeill: 1998, 147). Heidegger does not give a concrete example in "On the Essence of Truth," but this attunement or disposedness (*Befindlichkeit*) appears to be a holistic quality that colors one's entire perception of things, perhaps like a feeling of elation or melancholy. It prevails not solely as an inner attitude imposed on things nor as an objective fact, but as arising from the mutual interaction between a person and the things of the world.

Perhaps it may be said that, although extreme in example, when Shinran states, "Our desires are countless, and anger, wrath, jealousy, and envy are overwhelming, arising without pause; to the very last moment of life they do not cease, or disappear, or exhaust themselves," at bottom he is speaking of a similar inherent, though perhaps constantly changing, quality of existential involvement. (Notes on Once-calling and Many-calling; Hirota et al.: 1997, 488). For both Heidegger and Shinran, human existence is invariably attuned in some way in the world, and the things of the world are disclosed accordingly. In his writings Heidegger does not, like Shinran, employ a religious conception of evil, and tends instead to speak of the human potential for awareness of mortality. Nevertheless, in "On the Essence of Truth," he focuses on the "in-sistence, errancy, and the forgottenness of the mystery" that characterize ordinary human existence. Before we can turn to these concepts, however, we must consider the structure of interaction that characterizes the appearance of things.

4.4 Truth Involves a Reciprocal Dynamic of Engagement and Withdrawal

For both Shinran and Heidegger, the question of the nature of truth is directly linked to the problem of the finitude of human existence and the implications it holds for human apprehension. For both thinkers, the grasp of the everyday world around us is informed by constraints and biases stemming from inherent features of human existence, though ordinarily

we have no awareness of the partiality of our understanding. The emergence of truth, therefore, involves a multifaceted dynamic in which our usual perception of our world is fractured and a new awareness is somehow born apart from the domain of the habitual functioning of consciousness. In delineating the elements of this dynamic, Shinran and Heidegger show similarities in (1) the bi-directional movement underlying apprehension or presencing, and (2) the interaction of these movements as they occur on the parts of subject and object.

In "On the Essence of Truth," Heidegger delineates this complex of intertwined structural motifs involved in the interaction between human being and thing. According to Heidegger, comportment as directed behavior toward things arising against a contextualizing backdrop allows for beings to appear intelligibly and meaningfully. This, he states, is the more originary ground of the correspondence of statement and fact. Here, comportment is characterized as standing in an "openness" to beings, a "domain of relatedness" in which things are allowed to "stand opposed as object" and "become capable of being said" (McNeill: 1998, 141). We may view the situation from two interrelated stances, that of the subject and that of the object. Each side, however, is further characterized by an intricate, reciprocal dynamic.

Regarding the subject, as we have seen, the interested engagement with the things of the world that Heidegger terms "comportment" is necessary for things to emerge as meaningful. At the same time, in Section 4 of "On the Essence of Truth," titled "The Essence of Freedom," Heidegger discusses truth as "freedom," where freedom is understood not as a property possessed by the human agent exerting self-directed will, but rather as "freedom for what is opened up in an open region," freedom that "lets beings be the beings they are" (McNeill: 1998, 144). It is precisely in this freedom that human beings "ek-sist," or stand out from themselves, so that their engagement with things is not mere conceptual imposition or instinctual, patterned reaction, but a kind of "exposure" to things that allows them to be disclosed and to reveal themselves. In the open region characterized by freedom as "letting beings be" (*Seinlassen*), the interaction of knower and known unfolds and truth occurs as an "engagement in the disclosure of beings." Heidegger further states that "such engagement withdraws in the face of beings in order that they might reveal themselves." In rejecting notions of an autonomous subject assertively grasping objects in its surroundings, Heidegger emphasizes the freedom that "possesses the human being" as a receptive, "resolutely open bearing" toward beings that precisely "does not close up in itself" (McNeill: 1998, 149) within the constraints of its own willfulness and compulsive self-imposition.

Regarding beings or objects, it may be convenient to begin with a note added to a later edition of "On the Essence of Truth" on "essence": "(1)

quidditas – the "what" – *choinon*; (2) enabling – condition of possibility; (3) ground of enabling" (McNeill: 1998, 136; transliteration of Greek characters in original supplied by the author). This schema of three definitions of essence may be taken to reflect stages in the trajectory of Heidegger's investigation of truth in the essay. The first definition refers to a commonsense notion of the essence of a thing as the composite of qualities that makes it what it is. The second definition refers to the enabling condition that makes it possible for there to be things that appear to us in the first place in order for correspondence to take place. As we have seen, for Heidegger this is the dynamic of "world" or "clearing" or "openness" that allows for the disclosure of things as meaningful. Things become accessible within this horizon of intelligibility through the linguistic practices of humans in their comportment toward things. The third definition of essence probes the ground of this enabling – that which, while never entering the scope of conceptual thought in any way other than as the things disclosed within the horizon of meaning, grounds truth as "being" or "the being of beings."

Here, it is the overall contour and dynamic of Heidegger's three definitions taken together that may be brought into comparison with Shinran's thought. Heidegger's definitions may be taken to indicate three dimensions of the beings we perceive around us: the concrete things and events of our surroundings; the unapprehended "world" of practices and language that enables things to appear to us intelligibly; and the "mystery" that remains inconceivable even while it emerges to presence as the "unconcealed" or truth. There is an emergence to presence as the things of our everyday landscape, and at the same time there remains in things that which withdraws into mystery. In this way, we find a mirroring or reciprocity between the functioning of subject and of object in Heidegger's scheme. Just as the subject exercises freedom to "ek-sist" or stand out from a familiar grasp of the world, only thus to become exposed in receptivity to the appearing of a thing, so things become apparent while at the same time retaining their hiddenness.

For Shinran, the fundamental elements of the event of truth are human being and Buddha, not broadly, as in Heidegger, the things of the world around us. Nevertheless, we find developed in Shinran an analogous reciprocity of dynamics to displace the substantialist notion of the subject grasping objects without eliminating the subject-object dualism altogether. Thus for Shinran, truth as the genuine encounter of a human being with Buddha is a complex interaction that requires simultaneously opposing movements. On the part of the object, there is "form" (Amida Buddha, Vow, Name) emerging into human awareness from formless suchness or reality and, at the same time, functioning to bring beings to awareness of formless reality. On the part of the subject, there is the falling away of calculative thinking (*hakarai*), which is the imposition of our ordinary mode

of thinking in daily life on the working of Amida's Vow. According to Shinran, human beings become free of *hakarai*, and this being free of *hakarai* is itself the functioning of the Vow and the realization of *shinjin*.

4.5 Truth Is Fused with Untruth

The central theme of the second half of "On the Essence of Truth" is the third of Heidegger's three definitions of "essence," that which grounds truth as unconcealment. According to Heidegger, this is precisely the opposite of truth, that is, untruth or the concealment of beings: "Precisely because letting-be always lets beings be in a particular comportment that relates to them and thus discloses them, it conceals beings as a whole. Letting-be is intrinsically at the same time a concealing." (McNeill: 1998, 148).

It may be said that "world" as the enabling horizon of intelligibility also stands as the inconceivable limit of knowledge, but the recognition of the aspects of reality illumined within the "domain of relatedness" in which we conduct our lives is made possible by the concealment of those aspects that might obscure the firm outlines that meet our grasp and are meaningful to us. For Heidegger, then, concealment does not indicate merely the limits of the human capacity to know, but that which in fact is prior to knowledge: "The concealment of beings as a whole does not first show up subsequently as a consequence of the fact that knowledge of beings is always fragmentary. The concealment of beings as a whole, un-truth proper, is older than every openedness of this or that being." (McNeill: 1998, 148).

That is, without concealment that allows for the shape of human conception, and further, the concealment of this concealment, the appearance of beings within the field of intelligibility is impossible. This enabling ground is termed "the mystery": "not a particular mystery regarding this or that, but rather the one mystery – that, in general, mystery (the concealing of what is concealed) as such holds sway throughout the Da-sein of human beings." (McNeill: 1998, 148).

What is central here for our concerns is the structure of simultaneous opposition and nonduality that Heidegger delineates. He states it both in relation to truth, so that untruth "is most proper to the essence of truth," and in relation to essence, so that: "The proper non-essence of truth is the mystery. Here non-essence does not yet have the sense of inferiority to essence ... . Non-essence is here ... a pre-essential essence ... . [T]he non-essence remains always in its own way essential to the essence and never becomes unessential in the sense of irrelevant." (McNeill: 1998, 148).

In deconstructing the commonsense subject-object dichotomy founded on presuppositions of an autonomous, transcendental self, both Heidegger and Shinran assert similar structures of simultaneous opposition and non-

duality. The nonduality allows for the field in which human awareness of reality arises without the absolute, prior dichotomy of subject and object. In Heidegger, this field is the openedness unfolded as a reciprocal emergence and withdrawal both of human comportment that "stands open to beings" and of the disclosure of beings out of "the concealment of beings as a whole." In Shinran, the nonduality may be seen in particular in the assertion that the practicer's entrusting to the Vow itself arises from the mind of Amida Buddha (e.g. Notes on the Inscriptions on Sacred Scrolls; Hirota et al.: 1997, 493), and also in Shinran's depiction of both Amida Buddha (Vow, Name, etc.) and the practicer's mind of entrusting as arising from formless Buddha or reality (e.g. Notes on "Essentials of Faith Alone"; Hirota et al.: 1997, 461).

In both thinkers, the aspect of opposition or radical otherness in the structure of awareness allows for its functioning to apprehend truth even in the light of the ineluctable conditionedness and finitude of human conceptualization.

4.6 Recognition of Truth Occurs as a Fundamental Shift or Leap in Thinking

Both Shinran and Heidegger seek to delineate a complex structure of awareness to replace an erroneous commonsense notion. Further, they both recognize the inescapable discrimination of subject and object in the functioning of human consciousness, even while seeking to dissolve the reification of them. It may be said that in "On the Essence of Truth," Heidegger analyzes the structure of awareness nearer the pole of the object, while Shinran locates his focus closer to the pole of the subject. Thus, while Heidegger speaks of "the untruth that is most proper to the essence of truth," Shinran states that in the practicer who has realized *shinjin*, "blind passions and enlightenment are not two in substance." (Hymns of the Pure Land Masters, No. 32; Hirota et al.: 1997, 369). Of course, it is not that these poles are detached or clearly divided, and both thinkers necessarily treat elements of both poles.

At the same time, however, both thinkers, in distinguishing commonsense assumptions about truth from the knowledge of truth that they delineate, treat the shift from the former to awareness of the latter as a "leap" (to use Heidegger's word; McNeill: 1998, 148, but with an analogue in Shinran[4]), even while human awareness remains finite, situated, and partial. A

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[4] "This one mind is the shinjin of *leaping crosswise* … . This way surpasses all other teachings, and through it one quickly goes beyond the great ocean of birth-and-death and attains supreme enlightenment; therefore the term *leaping* is used." (Notes on "Essentials of Faith Alone" [Hirota et al.: 1997, 463; emphasis in original]).

"leap" would seem to be indeed necessary, since no thinking confined to the ordinary mode based on assumptions of an autonomous subject could lead to the paradoxical self-awareness they depict.

The perspective of the conditioned subject in Heidegger is particularly apparent in his concept of "erring." As we have seen, according to Heidegger, human beings carry on their lives circumscribed by a "horizon" that enables things to appear within it in contexts of meaningful relationships. The inherent pitfall for human beings is to become absorbed in and attached to the things within the world of everyday intelligibility, so that they forget about the ungrasped dimensions constituting and grounding this enabling horizon. Heidegger labels such absorption "in-sistence," a standing within one's particular horizon of intelligibility as though it were itself the totality of reality. He states:

> Man clings to what is readily available and controllable even where ultimate matters are concerned … . [H]umanity replenishes its "world" on the basis of the latest needs and aims, and fills out that world by means of proposing and planning. From these man then takes his standards, forgetting being as a whole … . Man's flight from the mystery toward what is readily available, onward from one current thing to the next, passing the mystery by – this is *erring*. (McNeill: 1998, 150).

It is not, however, that such erring is to be, or can be, eliminated though a kind of sudden illumination. Rather: "The insistent turning toward what is readily available and the ek-sistent turning away from the mystery belong together. They are one and the same." (McNeill: 1998, 150). Erring includes both an absorption in the things of the world and the concealing of concealment itself that is necessary for human understanding. Further:

> Humans err. Human beings do not merely stray into errancy. They are always astray in errancy, because as ek-sistent they in-sist and so already stand within errancy. The errancy through which human beings stray is not something that, as it were, extends alongside them like a ditch into which they occasionally stumble; rather, errancy belongs to the inner constitution of the Da-sein into which historical human beings are admitted … . The concealing of concealed beings as a whole holds sway in that disclosure of specific beings, which, as forgottenness of concealment, becomes errancy. (McNeill: 1998, 150).

Forgottenness of the mystery, then, is an inherent, ineradicable element of human awareness.

In Shinran, the leap into recognition of "the mystery" and the role of its concealment is discussed as the falling away of calculation and contrivance *(hakarai)* with regard to the Vow and the realization of *shinjin* (Buddha-mind as genuine entrusting to the Vow). Engagement with the Pure Land teaching that seeks to grasp it within the bounds of ordinary delusional thinking is analyzed as self-power, doubt, and calculative thinking, the de-

fining characteristic of which is the ultimate reliance on the judgment and resolve of the reified self. Although an analysis of the processes of ordinary awareness within the domain of everyday life is not a central issue for Shinran, it is clear that doubt and calculation turn on a refusal to recognize the transcendent inconceivability of the working of Amida's Vow.

Further, according to Shinran, both the falling away of *hakarai* and the realization of *shinjin* are themselves the working of the Buddha's wisdom-compassion. What may be most central here for our comparison with Heidegger is Shinran's assertion that, though *hakarai* may drop away (through no deliberate action or effort of the ego-self, which would be self-contradictory), the person's blind passions persist. The conditioned, perspectival, and inevitably attached perceptions of the self remain, but the apprehension of the inconceivable has brought about a fundamental change.

4.7 *Realization of Truth Is Salvific*

Both Shinran and Heidegger appear to depict a fundamental shift in awareness together with an ongoing interaction between modes of awareness. For Shinran, the shift, spoken of as Amida's giving the Buddha's mind of wisdom-compassion so that it becomes the practicer's, occurs once and for all and is expressed as salvific in religious terms (settlement of birth in the Pure Land, attainment of the stage of nonretrogression, etc.). Although the language of a decisive religious event is absent in Heidegger, he speaks clearly of a transformation: "[I]ndication of the essential connection between truth as correctness and freedom uproots those preconceptions [i.e. that freedom is a property of the human being] – granted of course that we are prepared for a transformation of thinking." (McNeill: 1998, 143).

Further, in other writings, Heidegger speaks of the shift in terms of an astonishment at the mystery that is perhaps open to comparison with the gratitude that Shinran emphasizes as the response of the person of *shinjin*: "step into the ... intimation of the wonder that around us a world worlds, that there is something rather than nothing, that there are things and we ourselves are in their midst."[5]

Of greater significance, however, is the interaction between that which is true and real and its other or opposite, for it is this interaction that unfolds as genuine human awareness. Heidegger states that "the full essence of truth, including its most proper nonessence, keeps Dasein in need of this perpetual turning to and fro" in the opposition and interaction of errancy and mystery:

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[5] GA 52 (*Holderlins Hymne "Andenken,"* lecture course 1941–1942), 64; quoted in Young: 2002, 60.

> By leading them astray, errancy dominates human beings through and through. But, as leading astray, errancy at the same time contributes to the possibility that humans are capable of drawing up from their ek-sistence – the possibility that, by experiencing errancy itself and by not mistaking the mystery of Da-sein, they *not* let themselves be led astray. (McNeill: 1998, 151).

Errancy as absorption in beings and the concealment of concealment cannot be eliminated from human cognition, but "by experiencing errancy itself" one may become aware of "the rule of mystery" at work in awareness itself.

For Shinran, the falling away of self-power (*hakarai*, calculation) leaves one's blind passions exposed to the wisdom that is Other Power, which becomes one's own as *shinjin*. In the ongoing interaction between the blind passions that color one's perceptions and the otherness of Buddha-wisdom in one, one's awareness may undergo a gradual transformation.

Heidegger, near the close of his essay, speaks of a transformed awareness (philosophizing, "the thinking of Being"), which he describes as an antidote to immersion in forgetfulness: "Philosophical thinking is gentle releasement (Gelassenheit) that does not renounce the concealment of beings as a whole. Philosophical thinking is especially the stern and resolute openness that does not disrupt the concealing but entreats its unbroken essence into the open region of understanding and thus into its own truth." (McNeill: 1998, 152). This self-aware thinking, which does not disrupt the concealing of mystery or Being, is transformative: "a thinking which, instead of furnishing representations and concepts, experiences and tries itself as a transformation of its relatedness to Being" (McNeill: 1998, 154).

Thus, for both Shinran and Heidegger, truth is less a matter of a proposition that is asserted and accepted than the emergence of a structure of awareness in which being or form is fused with, or backed by, formlessness. In closing, Heidegger gives an affirmative expression of this structure of awareness: "the essence of truth is the truth of essence." Shinran gives a negative expression: "no self-working is true working." Consistent with the departure from a commonsense notion of propositional truth, Heidegger writes that his expression "is no proposition at all in the sense of a statement," and Shinran states that, once we have realized the significance of *jinen* (the "spontaneous" salvific activity of Amida Buddha that occurs "of itself," beyond human designing), we should not be forever talking about it, lest it again become a matter of calculative thinking.

5 A Shin Buddhist Approach to the Significance of the Natural Sciences

The commonalities in the trajectories of thought regarding truth in Shinran and Heidegger suggest that further similarities might emerge when they are extended into concern with the natural sciences.

There are two major aspects of Heidegger's treatment of science and technology to which Shin Buddhists might refer in considering the significance of the natural sciences: his critique of the paradigmatic status science and technology have come to hold in contemporary civilization and of the resulting disclosive framework (which he terms *das Gestell*) of all beings in terms of how they may be manipulated, organized, and exploited for human goals; and his earlier "existential conception of science" itself, which provides a hermeneutic account of all sciences, whether natural or human, as projective frameworks that cast beings in terms of particular categories (Caputo: 1986).

Given Shinran's view of the depths of human self-attachment, karmic evil, and blind passions; his understanding of self-power as a false absolutizing of self, a self-enclosure within a one-dimensional world of calculative thinking; and his assertions of genuinely compassionate activity toward all beings as the highest realization of human life, it is not difficult to see potential resonances with Heidegger's foreboding critique of the aggressiveness of modern technological civilization and its results. Further, the devolutionary scheme of increasingly defiled cosmic epochs that Shinran refers to as the "last dharma-age" stands in stark contrast to the resolute optimism and anthropocentrism that motivates much popular support for scientific research, and bespeaks instead a focus on the existential finitude of human beings and the need for a transformed awareness. Nevertheless, Shinran's mythic expression does not entail Heidegger's concern with civilizational history. The fundamental significance of historical decline for Shinran lies in its manifestation of distance from the enlightened existence of Buddha. The crucial issue of human life, in every period of history, is the reaffirmation of contact with the realm of awakening.

Here, therefore, I will turn rather to Heidegger's hermeneutic understanding of science (in *Being and Time*) as it reflects thinking contiguous with the points of resemblance pointed out above.

There are two principle points of direct relevance here:

(1) Heidegger's treatment of science as one specific (inherently limited) form of interpretive human understanding, encompassed within his view of understanding as arising from within the historical life of human practices and as a form of contextualization in which things of the world are cast in a particular light.

(2) Heidegger's interest in the origins of the scientific attitude, which he finds in a shift from immediate engagement with things to a distancing objectivity, and his distinction of a "productive logic" that allows for sudden leaps in conception, in contrast to the logic of common conceptions of scientific method. The latter "understands science with regard to its results and defines it as 'something established on an interconnection of true propositions'" (from *Being and Time*; quoted in Caputo: 1986, 45).

Taken together, these insights provide a stance which supports a view of the history of major scientific breakthroughs in terms of Kuhnian paradigm shifts. It is precisely in the self-awareness that might arise from such shifts of horizon or paradigm that a Shin Buddhist might find the central significance of scientific enterprises. That is, the dialogical apprehension that may be gleaned from, for example, Shinran's words in Tannisho considered above, provides a means for grasping the significance of scientific knowledge and research from a Shin perspective. In its archetypal form, it is characterized by the shift in stance or mode of apprehension that occurs as "hearing the Vow" and that Shinran describes as the realization of Buddha-mind as *shinjin*. Further, it is fused with a new awareness of a dimension that Shinran speaks of as dharma-body and various other terms. Here, *hakarai*, as a form of self-attachment, drops away to expose the karmic historicity and linguisticality of the self in its self-awareness. This falling away of self-power is also Other Power, or the working of the Primal Vow, which Shinran terms *jinen* (the "spontaneous working" of wisdom-compassion; in its modern pronunciation, *shizen*, this term is the usual word for "nature" or the "natural world").

Here, I will note only that Shinran describes two dimensions of *jinen* – as the falling away of calculative self-attachment and as reality emergent for human apprehension. These two aspects together point to coordinates by which a coherent though dynamic view of the significance of understanding in the natural sciences may be formulated. In such a view, genuine scientific understanding occurs as a movement toward "truer" perceptions and simultaneously a removal from assumed frameworks of calculative thinking. It is a disclosure of the things of the world emergent in ever broader contexts of apprehension, though always with awareness that there can be no completeness, finality, or absoluteness.[6]

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[6] Because of limitations of space, the question of technology cannot be specifically treated here, although it is inseparable from human (including scientific) knowledge. Again, significant comparisons may be drawn between basic motifs regarding the modes of emergence or apprehension of form and formlessness, beings and Being, in Shinran and Heidegger. In particular, Shinran's conception of *jinen* ("naturalness," spontaneous working of wisdom-compassion) may be compared with Heidegger's discussions, shortly after "On the Essence of Truth," of "earth" and "world" in "The Origin of the Work of Art" and of *phusis* in *Introduction to Metaphysics*. Publication of this discussion will have to await another occasion.

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Chapter 5
Buddhism, Christianity, and Physics: An Epistemological Turn

Mark T. Unno

1 Introduction

Until now, most dialogue and comparisons between the normative claims of religion and science have been carried out between natural science on the one hand and any one particular religion on the other, most often Christianity, but alternately Buddhism, Hinduism, and other religions. The sense that there is a distinct need and rationale for multiple religious perspectives to engage with science and at the same time with one another is just beginning to emerge. This is the result of the confluence of two streams of thought: interreligious dialogue and religion-science dialogue. In a world of religious diversity, interreligious dialogue is necessary for the peoples of the world to work together towards a better world, in both understanding and in practice. In a world dominated by natural science – its theories and its applications in technology – where scientific discourse has emerged as the *lingua franca*, religionists must consider the interface between religious and scientific discourse in addressing the problems of this world.

Perhaps it is the complexity of facing both sets of dialogues simultaneously that has prevented the triangulation of interreligious and science-religion discourse from developing until now. Perhaps each of these dialogues needed to develop sufficiently before the foundations essential for this triangulation to go forward could be established. Whatever the reason, it now seems both possible and necessary for this to take place. Ideally, of course, not just Buddhism and Christianity would be involved, but other religions also. However, the pairing of these two religions in encounter with natural science in the current volume is fortuitous. For, in recent decades, representatives of these two religions have arguably engaged in the science-religion dialogue more vigorously than have some other religions. In this sense, they are among the most primed to engage with one another on the topic of natural science as well as with science itself.

Paul Ingram states succinctly what now seems obvious but is in fact just beginning to happen:

> The natural sciences inspire great reverence, wonder, and awe for most scientists and many religious persons throughout the world's religious traditions. This is so because the sciences provide a continual stream of remarkable insights into the nature of physical reality across a wide range of domains. In doing so the sciences both change our world and our worldviews, and in the process, our understanding of ourselves. Here lies the source of the many conceptual challenges to all religious traditions and systems of practices. As the pace of scientific discovery and innovation exponentially continues, there arises an urgent cultural need to reflect thoughtfully and critically on these changes and challenges in a constructive dialogue involving the world's religious traditions, which of course includes Buddhism and Christianity. (2007, 185)

The theological, philosophical, scientific-technological, and political challenges that face religionists in the coming decades are enormous. From global conflict and climate change to resource depletion, issues that involve the multilogue of religions and science are of such a scale that there are serious questions as to whether humankind will adequately be able to address them. Regardless of the scale of the problems, and the apparent futility of academic hair-splitting, any efforts to come together and meet the challenges that face our world must include, even begin with, a careful consideration of basic assumptions: aims, methods, epistemology, metaphysics, and so on.

Within these areas, inquiry into metaphysical assumptions and claims is perhaps the most exciting and dramatic: What might God or buddha-nature have to do with black holes and quasars? What might string theory have to tell us about "three thousand worlds in a single thought"?[1] When such disparate intellectual traditions such as natural science, Buddhism, and Christianity are brought together, basic questions concerning the nature of human knowing must be addressed before moving on to big metaphysical questions. Thus, in relation to science and in relation to each other, Buddhists and Christians need to examine the limits and possibilities of human knowledge, the assumptions concerning the parameters of knowledge, the aims and methods employed within each discipline.

In this regard, we find ourselves in a situation not unlike Immanuel Kant who, faced with an impasse in metaphysics, took an epistemological turn in the *Critique of Pure Reason* and then in the *Critique of Practical Reason* in order to establish method in relation to the limits and possibilities of human knowing. Unlike Kant, who lived in a simpler Newtonian world as far as science was concerned, we live in a world where multiple paradigms and even multiverses may co-exist at different levels and in diverse contexts. In crafting a bench, the craftsperson is Newtonian; in interpreting the redshift in calculating the speed of celestial bodies, the astronomer is Einsteinian;

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[1] *Yinian sanqian shijie*, the Chinese Tiantai Buddhist notion that "three thousand worlds are contained in a single thought."

in creating microchips for the laptop computer that is used to compose this chapter, the fabricator applies quantum mechanics. Yet, craftsperson, astronomer, and laptop user are often the same person, someone who may not recognize her or his dependence on multiple physical frames of reference. These paradigms, although building successively upon one another, are also based upon mutually incompatible frames. It is the very points of incompatibility, involving basic assumptions concerning the constitution of time, space, and the objectivity of scientific measurement, that help to define what can and cannot be known, and how something can be known.

These paradigm shifts occur not only through a vertically integrated tradition such as within Western physics, as Thomas Kuhn (1996) suggested, but also horizontally, as one shifts from one discourse to the next, from science, to Christianity, to Buddhism.[2] Depending upon the paradigm, the range, the method, and the character of knowing varies: What can or cannot be known, how, and just what is the thing that is known? How do the answers to these questions overlap and diverge among physics, Buddhism, and Christianity?

This chapter, within its limited scope, takes up these epistemological questions in relation to two specific topics: (1) What is the relation between mind and matter (mind and body), knower and known? (2) What is the relation between past, present, and future; what is the direction and character of time? These questions, in turn, are discussed in relation to two ideas in modern physics: (3) the anthropic principle, concerning the relation between the scientist as observing subject and the universe as observed object, and (4) the disruption of the directionality of time from past to present to future, according to quantum light particle-wave theory, wherein the past is determined in the present. Interestingly, each of these ideas may be interpreted from either traditionally Christian or traditionally Buddhist perspectives; considered apart from these ideas from modern physics, the two religions appear to diverge from one another on the larger questions that these ideas bear upon. That is, modern physics can surprisingly be interpreted to occupy a middle ground between Buddhism and Christianity, such that modern physics is epistemologically closer to both religions than they are to each other. Whether such a view will withstand closer scrutiny is uncertain, but this chapter will have served its purpose if it stimulates further study. In pursuing these questions, this chapter draws in particular on the work of Ian Barbour who engages the science-religion dialogue from a Christian perspective, and that of David Bohm who engages the dialogue from an Asian-influenced paradigm that is largely in accord with the notion of two-fold truth found in Mahayana Buddhism.

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[2] Of course, there are vertical paradigm shifts within each religious tradition, complicating the situation further.

2 *Mind and Matter: Epistemology and Ontology*

2.1 *Cartesian Dualism and the Problem of Explanation*

In modern physics, mind and matter have been considered to be distinct in such a manner that the latter is the object of inquiry for the former. The objectivity and validity of modern natural science rests upon the fact that the universe as a whole can be analyzed independently of the subjective biases of the scientist. This is the basis for the scientific observation, measurement, prediction, and manipulation of empirical phenomena. In a word, the significance of modern physics lies in its discursive *explanatory power.* Scientific explanation depends on the formulation of general theories, and the ideal of theoretical reflection is to attain the greatest possible degree of universality; this is what gives it its power.[3] However, there is a kind of self-imposed limit on this explanatory power; since the mind/matter distinction has historically been at the heart of modern physics, problems arise when science seeks to include the mind within its theories. Thus, there is a tension between the drive to *explain everything*, to provide a coherent view of the universe and all of its contents, and the mind/matter distinction that is so basic to modern science yet limits its power of explanation. As physicist Abner Shimony states,

> "[T]he closing of the circle" ... is one of the chief requirements for a coherent worldview ... But unless a physicalistic explanation of mental events is correct – which seems incredible to me, for reasons that are naive but strong – the definite physical outcomes of experiments constitute only a necessary but not a sufficient condition for human experience and inference. The greatest obstacle to "closing the circle" is the ancient one which haunted Descartes and Locke – the mind-body problem. (1989, 37)

Behind this epistemological problem lies an ontological one. Modern physics, especially since the time of Descartes onwards, has assumed a materialistic ontology that is correlated with but distinct from an immaterial consciousness. This is a philosophical (or metaphysical) presupposition, not a scientific one. As B. Alan Wallace states, "Descartes' followers denied consciousness and all other cognitive events any active role in the physical universe, introducing this view as a point of metaphysical dogma, not as a scientifically demonstrated conclusion." (1989, 143) Descartes provided little in the way of a rationale for this bifurcation other than to say that God placed this division within the created world. For scientists who do not be-

[3] The following statement by Bas C. van Fraassen may be regarded as just one example of this basic premise: "Empirical adequacy of a theory consists in its having a model that all the (models of) *actual* phenomena will fit into." (1989, 109)

lieve that this provides a sufficient explanation, bridging this gap between mind and matter poses a serious problem. As David Bohm states,

> Descartes clearly understood this difficulty and indeed proposed to resolve it by means of the idea that such a relationship is made possible by God … . Since then, the idea that God takes care of this requirement has generally been abandoned, but it has not commonly been noticed that thereby the possibility of comprehending the relationship between matter and consciousness has collapsed. (1980, 197)

2.2 *Quantum Formalism and the Problem of Ontology*

The epistemological problem of the relationship between mind and matter has been an important philosophical and metaphysical issue throughout modern physics, but the discussion of this problem has intensified since the formulation of quantum theory. In the history of philosophy, problems of ontology have often forced a reconsideration of epistemology. This has been true in much of modern philosophy including Descartes, Hume, Kant, Husserl, and Heidegger. In modern physics, the basic materialist ontology in place since Newton had been relatively stable until the advent of quantum mechanics. The validation of quantum mechanics did not necessarily mean the abandonment of materialist ontology, but it did raise serious questions about the ontological status of physical reality.

In the quantum relationship between description and reality, a materialist ontology based on a correspondence theory of truth is upheld when moving logically from reality to description but not necessarily when moving from description to reality. As Werner Heisenberg states,

> The two statements, "The atom is in the left half" and "It is true that the atom is in the left half," belong logically to different levels. In classical logic [operating within a materialist ontology] these statements are completely equivalent, i.e., they are either both true or false. It is not possible that the one is true and the other false. But in the logical pattern of complementarity [in quantum theory] this relation is more complicated. The correctness or incorrectness of the first statement still implies the correctness or incorrectness of the second statement. But the incorrectness of the second statement does not imply the incorrectness of the first statement. If the second statement is incorrect, it may be undecided whether the atom is in the left half; the atom need not necessarily be in the right half. There is still complete equivalence between two levels of language with respect to the correctness of a statement, but not with respect to the incorrectness. From this connection one can understand the persistence of the classical laws in quantum theory: wherever a definite result can be derived in a given experiment by the application of classical laws the result will also follow from quantum theory, and it will hold experimentally, [but the opposite is not always true]. (1958, 184f)

This asymmetry between description and reality has evoked various responses with regard to the relation between mind and matter, epistemology and ontology.

According to Ian Barbour (n.d.), in the dialogue between science and philosophy/theology generally, three basic positions have been set forth regarding the relation between mind and matter: eliminative materialism, the irreducibility and inaccessibility of consciousness to science, and two-aspect theories. In the first, consciousness tends to be reduced to the terms of scientific materialist ontology. In the second, consciousness is regarded as distinct from and at some level impenetrable to the findings of modern science. In the third, a position often espoused by neuroscience, mind and matter are regarded as two sides of the same coin: correlated with each other and to varying degrees acting in unison (as in the case of mind and the brain) yet never really interacting in a clearly causal manner.

All three cases pose various possibilities and problems, but it seems to me that the basic Cartesian problem remains. Science (and philosophy) would like to explain how to bridge the gap between mind and matter, but in such a way that preserves the mind/matter distinction. Only in the case of eliminative materialism is this explanatory gap overcome. However, this position, which negates any sense of mental autonomy, not only makes debate virtually meaningless (since debate would be merely an epiphenomenon of neural interaction) but leaves most philosophers and theologians out of the conversation.

What happens to the mind-body problem when considered in the specific context of quantum physics? There are at least three approaches taken by quantum physicists. One is to preserve the Cartesian division by substantiating the independent existence of the material universe. A second alternative is to bracket the question of the material universe and limit the discourse of modern physics to a world of theoretical meaning, performing a kind of physicists' counterpart to Husserl's phenomenological reduction. A third alternative is to posit some causal link between mind and matter while preserving the distinction between the two.

2.2.1 The Independent Existence of the Material Universe

One possibility is to assert the independent reality of the material universe based on the findings of quantum mechanics. The work of J.S. Bell in particular has provided a basis for a theory of the independent existence of reality (Barbour: 1997, 175–177; d'Espagnat: 1991; Bell: 1991). Bell's work has been taken to imply not that the observer is eliminated as such but that the nonseparability of two contingent, non-local events makes it necessary to postulate the existence of reality without reference to an observer, or the observer-observable framework. This does not mean the elimination

of mind, or the denial of any correlation between mind and matter, only the independent existence of physical reality. In this sense, the problem of relating mind and matter remains.

2.2.2 *Wheeler's Coherence View of Physics as Based on Meaning*

Another way to approach this problem is to bracket the question of an independent reality "out there" and to only speak of a coherent world of meaning based on scientific observation and the agreement of a community of scientists with regard to statements of theoretical and applied physics. According to Bernard d'Espagnat, "Wheeler urges us 'to abandon for the foundation of existence a physics hardware located *out there* and to put in instead a *meaning* software located who knows where.'"[4] Given the uncertainty of the objective status, the "what" of the "out there," prior to the quantum reduction that occurs in the collapse of the wave function, this view of physics as a world of coherent meaning provides a means of circumventing questions about a reality that seems unknowable.

The problem with this, of course, is precisely the "out there" which is "who knows where." As d'Espagnat points out, physics is about acquiring knowledge of what is really there in nature; if it simply turns out to be an internally coherent linguistic system referring to that which is "observed," "measured," and so on, then problems of internal coherence begin to emerge. There may need to be an actual "out there" corresponding to the language of "out there," just as Kant thought he needed the *Ding an sich,* the "thing-in-itself," in order for his conception of the transcendental apperception to make sense.

2.2.3 *Wigner's Mentalistic Approach*

One might also recognize the relative distinction between consciousness and the physical world but posit some scientifically based causal link between the two. This view holds that "quantum-mechanical description should be applied right up to the macroscopic level and that the occurrence of specific macroscopic events is a consequence of an interaction of human consciousness with the physical world which cannot be explained within the framework of the laws of physics itself." (Leggett: 1991, 94) As A.J. Leggett (ibid.) points out, however, involving consciousness in this causal manner raises issues concerning the nature and status of this consciousness about which it is difficult to formulate questions that would clarify the

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[4] D'Espagnat: 1991, 154f (emphasis in original); d'Espagnat cites Wheeler: 1984. Note: This idea of a coherence view that transfers the focus from objective materiality to subjective meaning is really d'Espagnat's interpretation, not Wheeler's. As shown below, Wheeler actually advocates a position that supports the inseparability of matter and consciousness.

causal link let alone answer them. Partially for this reason, this mentalistic aspect of Wigner's work remains very much a minority view.

3 The Anthropic Principle: Scientific and Religious Perspectives on Mind and Matter

3.1 The Anthropic Principle

In modern science basic assumptions of theory and method are called into question when empirical phenomena appear that do not easily fit into existing paradigms. Foundational concerns regarding mind-matter relations remain on the philosophical plane unless it can be related to distinct scientific phenomena, as is the case with the anthropic principle.

In general, as noted above, modern natural science has historically sought to extricate material objectivity from mental subjectivity. However, the very process of seeking to determine the conditions of the objective, material universe has led to the discovery that the mind may not be entirely exterior or accidental to the material universe, that the material universe seems to have developed to create optimal conditions for the formation of human mind and life. For example, the coefficient of expansion of the universe must lie within an extremely narrow range for the universe to support life. That is, if the rate of expansion is too fast, then the diffusion of matter is too great to allow sufficient gravitational forces to act upon to form galaxies, star systems, and planets like Earth that support life. If the rate of expansion is too slow, then there is not sufficient diffusion of matter, and the stuff of the universe would collapse back unto itself by the force of gravity, precluding the possibility of carbon-based life forms such as human beings.

Other such constants and data from the universe suggest either that (a) the universe contains the optimal conditions for life and mind to evolve (weak anthropic principle, or WAP), or (b) the universe contains not just the sufficient conditions for life and mind but their necessitating conditions, rendering a mutually necessary relationship between mind and matter (strong anthropic principle, or SAP).[5] John Wheeler suggests a particularly strong form of SAP, the participatory anthropic principle (PAP), in which life and mind in the form of observers are necessary for the creation and formation of the universe. Part of this is discussed below in the examination of Wheeler's delayed-choice experiment.

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[5] For definitions of the weak and strong anthropic principles, see Barrow and Tipler: 1986, 15–23.

John Barrow and Frank Tipler suggest an even more radical version that they term the final anthropic principle (FAP): "Intelligent information-processing [mind] must come into existence in the Universe, and once it comes into existence, it will never die out [completely]." (1986, 23) FAP builds on SAP in the sense that, once life and mind become cosmogonically necessary, it seems overly arbitrary that the intelligent mind would die out without leaving long-term effects.

The anthropic principle in its various versions brings the foregoing discussion of the mind-matter relation into even greater focus. It compels consideration of the relation between mind and matter as contingent or as necessary.

In any case, the anthropic principle in physics in its most basic form suggests that we see the universe with its various laws and constants the way it is because we exist (Hawking: ²1998, 128). At first glance this seems self-evident: We have no choice but to see the universe the way that we see it. It was Kant (1965) who in the eighteenth century posited the intuition of time and space and the categories of the understanding of the transcendental apperception as, on the one hand, the universal conditions for human knowledge and, on the other, the basis for scientific objectivity and the universality of human knowledge. Although the Newtonian basis for Kant's claim to universality has been displaced over time, the promise of universality continues to be a cornerstone of scientific inquiry. It makes eminent sense that the universe reveals its regularity to us because we are constituted to see it in that way.

A closer look at the anthropic principle, however, uncovers some unsettling problems, for it is more than that the universe is filtered and colored by the conceptual framework through which we humans view it. "We see the universe ... the way it is" does not merely mean, "We see the universe the way we see it," but rather, "We see the universe objectively as it exists because we exist." The reason why this can be unsettling becomes evident when juxtaposed with the sense of the contingency of human existence that the progress of natural science and in particular astrophysics has tended to reinforce. Steven Weinberg (1977), for example, states that the progress of natural science has led to the continual negation of mythological discourse that places human beings at the center of a world of cosmic meaning. According to this view, the basis for the scientist's meaningful human existence is undercut by the very process of scientific inquiry.

The anthropic principle taken to its logical end, however, could be taken to mean that the universe with all its order and regularity would not exist without the scientist who discovers this order. It is almost as though the eye of the scientist is the cosmic eye with which the universe sees itself. This tension between the contingency and necessity of human life and mind is heightened in light of the fact that the anthropic principle is based not only

on scientific theories in general but on the very specific values associated with these theories, such as Planck's constant. As Robert Russell states,

> Over the past two decades, scientists have discovered that the constants of nature, such as the speed of light, Planck's constant, or the strength of the fundamental physical forces, seem fine-tuned for life. Granted that life can only evolve if the right planetary and stellar circumstances are available. Still, if these fundamental constants had been different by even one part per million, [then] our universe would have been entirely lifeless forever. (1996)

Thus, the anthropic principle, especially in its strong form, seems to point to a paradox (or flat-out contradiction). The same line of scientific inquiry that for some scientists has heightened the sense of human contingency in a barren, hostile universe now affirms the human being as akin to co-creator and articulator of cosmic order. Is human consciousness a happenstance on the fringes of this vast universe, or is it integral to the cosmos, possibly even a manifestation of cosmic or divine knowledge and power? Can the universe, as Russell puts it, "be seen as 'anthropic,' that is, one in which life and mind are 'at home,' essential parts of our universe?" What is the relation between mind and matter – the personal, individual need for order and meaning, and the seemingly impersonal reaches of the cosmos? By turning scientific inquiry back upon the subject, the anthropic principle incites existential and theological questioning within the framework of modern physics. The scientific question of mind-matter relations, then, becomes inseparable from the question of existential meaning.

3.2 Ian Barbour's Process Theology, Christianity, and the Anthropic Principle

Ian Barbour, one of the leading Christian thinkers engaged in the science-religion dialogue, provides a helpful scientific and theological framework in which to consider the mind-matter relation although he does not address the specific ramifications of the anthropic principle at any length. In discussing the role of mind in scientific inquiry, Barbour (1997, 184–186) is critical of physicists such as Wheeler and Wigner whom he takes to be ultimately unrealistic, attributing to the mind a power to determine physical reality that it does not have. He maintains the clear separation between mind and matter; however, he rejects any classical realism that asserts apodictic certainty regarding the existence of objective reality (191), whether divine or material. In its place he asserts a critical realism, one that maintains the objective status of divine and material reality, but within a framework answerable to the critical requirements of logical coherence, empirical science, and essential moral and theological assumptions. The result is a process theology responsive to the findings of modern science including physics, one that is epistemologically in line with the critical philosophy of

Kant. Like Kant, Barbour maintains the need for the objective world, the thing-in-itself, as well as God-in-himself, -herself, or -itself.

However, reflecting the claims of both quantum mechanics and process thought in their respective fields of physics and philosophy, he takes a more interactive view of mind and matter on the one hand, and human beings and the divine, on the other. Thus, while for Kant, there is a *correlation* between mind and matter, humans and the divine, for Barbour it is more *interrelation* than *correlation*. Thus, he describes the *interaction* of observed and observer in the realm of physics, and the mutual *participation* of God, human beings, and nature in the moral and religious realms (193, 322).

In this critical realism, the nature of this interaction or participation itself always remains mysterious and opaque to a greater or lesser degree due to the very fact that mind and matter, the human and the divine, are never completely united, and the separation creates a gap both epistemologically and ontologically. Thus, while Barbour discusses the unsatisfactory nature of various physicists' attempts to account for the role of mind in physics, and he asserts the interaction of observed and observer, he does not provide any alternative positive account of the interaction between the *mind* of the scientist and the physical world, or the nature of the mutual participation of human beings and the divine, whether it be mind-to-mind, spirit-to-mind, spirit-to-mind/body, or some other combination. Rather, his unstated assumption is a kind of unspoken faith in both instances. This is not blind faith, but faith as informed belief, informed by critical reflection on the material and historical worlds, the physical and moral worlds, and by scientific and religious tradition as the accrued inheritance of human community.

The nature of the relationship between mind and matter, and the human and the divine, can best be characterized as mysterious, favoring the omnipotence of God on these matters, and not ignorance on the part of human beings, but faith. Epistemologically, Barbour maintains the *critical* separation of mind and matter, human and divine, to reflect and maintain the asymmetrical mystery of the human-divine relationship, to leave room for this unspoken faith relationship, and to enunciate his version of process theology as a *speculative* metaphysics. Just as Barbour the physicist seems to appeal to a critically informed faith in the objectivity of the physical world, implicit in Barbour the Christian appears to be a critically informed faith in the transcendence of the divine and his own relationship to God.

In a certain sense, Barbour's process theology is quite distinctive and would be unfamiliar to many believing Christians in the degree to which it takes into account the highly refined and nuanced findings of modern natural science and process thought. Yet, in its view of the role of divine mystery, of the limits of human knowledge, of implied faith and informed belief, and of the objectivity and transcendence of matter and the divine,

his view of science and religion is broadly in line with Protestant-based Christian views articulated by others before him, such as Kant.

In this view, the anthropic principle supports the idea that human beings do have an essential place in the cosmos, in such a way that leaves open the relationship between the *mind* of the scientist and the *facts* of the material universe. Although Planck's constant, the power of gravity and the relative speed of celestial bodies may all exist in a delicate balance that enables life, this proves nothing metaphysically or epistemologically. Rather, it suggests or reinforces the subtle mystery and faith of the believing Christian who senses but cannot see the power of the divine, the novelty and order of the cosmos. Interestingly, implicit in Barbour's view is also the reintroduction of the divine as the link between mind and body, what Bohm claimed was lost forever with the separation of physics from Christian theology.

3.3 David Bohm, Mahayana Buddhism, and the Anthropic Principle

Mahayana Buddhism, the form of Buddhism with which the present author is most familiar, especially in its East Asian articulations, consistently subscribes to the view of the two-fold truth of form (Sanskrit, *rupa*) and emptiness (*sunyata*) as a cornerstone of its epistemology. In contrast to the separation of mind and matter, of human beings and ultimate reality, that renders the *mystery* and enables the creativity of human-divine relations in Christianity, awakening to emptiness or nonduality as the deepest reality of form or the world of appearances yields ultimate religious *knowledge* in Mahayana Buddhism.

According to the theory of the two-fold truth, there are two levels at which reality can be grasped: form and emptiness, conventional truth and highest truth. At the level of form or conventional truth, one sees reality through the filter of a constructed world of conceptual meaning. At the level of highest truth, one is free from attachment to one's preconceptions of reality; unhindered by the imposition of a distorting conceptual lens, one sees reality as it is, emptied of false constructions. However, this does not mean that the world of conventional meaning and conceptual constructions is entirely abandoned. When one's awareness is transformed through awakening to the highest truth of emptiness or oneness, then one lives in and sees the world of variegated form and ideas in a new, undistorted light.

In Zen Buddhism, there is the well-known saying: "A mountain is a mountain, a mountain is not a mountain, a mountain is a mountain." When one only sees the world in terms of one's preconceptions at the level of conventional truth, then one sees the mountain, not as it is in itself but in terms of one's *idea* of the mountain. However, when one allows one's preconceptions to fall by the wayside and begins to see the mountain as it is, in its such-

ness (*tathata*), then, paradoxically, one no longer sees the mountain because there is no object to be seen separated from the seeing subject by an intervening conceptual filter. One has become one with the mountain, at which point, one "sees" the mountain without seeing it in any particular way. Such a mode of "seeing" is often described in terms of *samadhi*, or meditative oneness. It is like being so entranced by a scene of nature that one forgets oneself entirely, and one is no longer aware of being transfixed by the scene lying before. When one awakens out of this state, then mountains are once again mountains, but this does not constitute a mere return to one's previous mode of cognition. One sees the mountain in a different light because, having been immersed in the realm of emptiness or oneness, one now sees the mountain as simultaneously distinct from oneself and *as* oneself.

Thus, in Mahayana Buddhism it is *gnosis* rather than faith that is the goal of the religious path, in which the practitioner recognizes that the world of conventionally constructed conceptions is empty or devoid of any inherent reality. In so doing, he realizes that all distinctions, including that of mind and matter, mind and body, self and other, life and death, are illusory. Yet, this does not lead to the abandonment of the world of form, of appearances; rather, one comes to vividly see the ever-changing dynamism of Buddhist suchness in which the very nature of form and of the world of distinctions unfolds intimately as one's own reality, in oneness, as nonduality.

Logically, this is often articulated in terms of the classical tetralemma (*catus-koti*):[6]

"A" exists ["A" is form].
"A" does not exist ["A" is empty].
"A" both exists and does not exist ["A" is form and emptiness].
"A" neither exists nor doesn't exist ["A" is neither form nor emptiness].

The first line represents a naive realist view, in which words are taken to correspond to a static, objective reality: "The vase exists, and there is a one-to-one correspondence between the word 'vase' and its unmistakable object."

The second line asserts that there is no such thing; words are merely conceptual designations for which there is no objective correlate: "What is a 'vase' to one person is a 'pitcher' to another." Language is conventional, based on a shared community of discourse. When one recognizes the illusory nature of linguistically defined reality, and one empties oneself of attachment to any form or conventional truth, one realizes the highest truth beyond words, before linguistic distinctions are made.

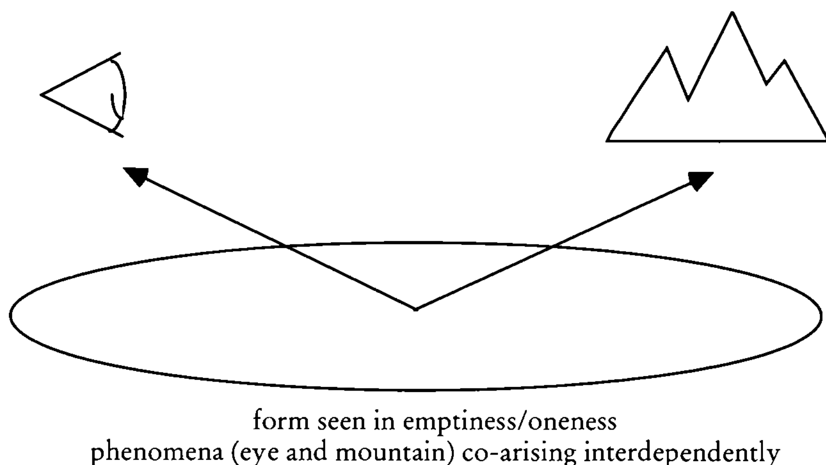
In this world freed from the rigid artificiality of arbitrarily imposed distinctions, the true nature of each form, each phenomenon, vividly appears

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[6] See, for example, the Diamond Sutra: 1924, 750a.

in one's awareness as inseparable from one's own deepest reality. This is line three (form and emptiness) where form is not denied but rather its true nature revealed as none other than empty of any fixed, dogmatic essence. Returning to the Zen saying concerning the mountain, one can see this progression from naive realism, to the recognition of the emptiness of words, to the two-fold realization of form-as-emptiness, of multiplicity-in-oneness: "Before enlightenment, a mountain is a mountain. During enlightenment, a mountain is not a mountain [because words are forgotten]. After enlightenment, a mountain is a mountain [because now I see the mountain before me, as it is, rather than merely my idea of it. I see it as spontaneously unfolding, intimate and inseparable from me]."

In the temporal sequence, the practitioner emerges from the *samadhi* of meditative oneness in which there is neither practitioner nor mountain, to awaken to the world of distinctions, in which she again objectifies and names the "mountain," only now she sees the mountain not as a distinct object but as intimately part of her, or more precisely *as* herself in the deepest sense of her own existence. This emergence of phenomena out of *samadhi*, in which distinctions are observed but lack inherent reality, occurs as interdependent co-origination (*pratitya samutpada*), interdependent because there is no seer apart from seen, and co-originating because they arise simultaneously, momentarily, only to be dissolved back into the oneness of *samadhi* moment by moment.



form seen in emptiness/oneness
phenomena (eye and mountain) co-arising interdependently

The fourth line is the line of awakening itself, leaving behind discursive analysis to manifest emptiness in the moment, here-and-now. Neither the *concept* of "existing, form" nor the *concept of* "non-existing, emptiness" can capture the reality of form and emptiness. It is only in letting go of linear intellection altogether and in awakening to the reality beyond words

that one realizes, "The mountain is myself, I am the mountain." "No preconceptions of 'mountain' cloud my mind; thus, the wordless reality of the mountain is vividly manifest."

When applied to the anthropic principle, the ramifications of such an approach to knowledge are readily apparent. The questioning of discursive distinctions, in relation to the mind-matter relation, taken to its logical end ought to yield a point at which the distinction between the two collapses. Indeed, if the mind of the scientist is inseparable from the conditions for the existence of life, including that of the scientist, then ultimately, there is no definable divide between mind and matter. Physicist David Bohm, who was influenced by Indian philosopher Jiddu Krishnamurti and Buddhist thinkers such as the Dalai Lama, suggests that mind and matter, thought and thing, are mutually implicit, as are all other phenomena, such that there is a wholeness to the universe in which all distinctions ultimately dissolve.

> We have to say that mind enfolds matter and the body in particular. Similarly, the body enfolds the mind but also in some sense the entire material universe … .
>
> [However,] we are led to propose further that the more comprehensive, deeper, and more inward actuality is neither mind nor body but rather a yet higher-dimensional actuality, which is their common ground and which is of a nature beyond both … in which body and mind [matter and mind] are ultimately one. (1980, 209)

Yet, just as Buddhist emptiness or oneness cannot be realized apart from the present moment of awareness, the wholeness of Bohm's implicate order cannot be understood propositionally or discursively. Language is not the problem, as we saw with the Zen mountain example, but rather reliance upon or attachment to the discursive function of language. The peculiar character of the Buddhist tetralemma cited above lies in its formal logic, designed to turn the practitioner's attention away from the propositional function of logic to the awareness of emptiness in the present moment. It is intended to turn a moment of objective analysis into a moment of subjective awareness in praxis.

The epistemological relation between mind and matter, subject and object, is inseparable from the formal logic that is designed to collapse the separation of mind from its object out there, from both the object itself and the theory about the ontological status of that object. The object can only be known in light of its wholeness, and the truth of the theory of this wholeness can only be ultimately realized in the present moment, inseparable from the subject. This holds true for both Bohm's implicate order and Buddhist emptiness.

This supports a Bohmian version of the SAP that is quite different from Barrow and Tipler's FAP. For Bohm, the implicate order supports a SAP that reveals a nondual mind-matter oneness realized in the present. For

Barrow and Tipler, the FAP supports a discursive intelligence that continues endlessly into the speculative future.

3.3.1 A Musical Analogy

A musical analogy may be drawn with the playing of a Mozart piano concerto in order to illustrate Bohm's view of the implicate order. The musical score may be compared with the words and concepts that define the conventional, conceptually constructed world of form and meaning. The ability to read the score does not in and of itself constitute true knowledge of the music.

The pianist's real knowledge of the music is based on the ability to perform, or to embody the score. This kind of knowledge can only be acquired through an intimate understanding of the interrelationship between her own part and that of the other players. This requires not merely the ability to translate the score into sound but the ability to see into the heart of the composer and to grasp the flow of the orchestra as a whole. At the moment that the pianist plays a solo phrase, she does not become independent from the rest of the orchestra; rather, the solo phrase is a culmination of everything that came before and anticipates everything that is yet to come. In that sense, knowledge of the composer's intent, the relationship with the rest of the orchestra, and the entirety of the concerto is embodied in every phrase, each note, as the music unfolds from moment to moment. On the part of the pianist, reason, emotion, intuition, the body, and the piano must all come together to capture and create each moment of music.

David Bohm uses a similar musical analogy from the side of the listener to describe the way in which notes that appear to be distinct in the explicate order requires an understanding of the way in which various notes and sensations are *enfolded* in one another, pointing to the wholeness of the implicate order.

> Consider, for example, what takes place when one is listening to music. At a given moment a certain note is being played but a number of previous notes are still "reverberating" in consciousness. Close attention will show that it is the simultaneous presence and activity of all these reverberations that is responsible for the direct and immediately felt sense of movement, flow and continuity. To hear a set of notes so far apart in time that there is no such reverberation will destroy altogether the sense of a whole unbroken, living movement that gives meaning and force to what is heard ... .
>
> As one can discover by further attention, the "reverberations" that make such an experience possible are not memories but are rather active *transformations* of what came earlier, in which are to be found ... various emotional responses, bodily sensations, ... and the evocation of a wide range of yet further meanings, often of great subtlety. One can thus obtain a direct sense of how a sequence of notes is enfolding into many levels of consciousness, and of how at any given moment,

> the transformations flowing out of many such enfolded notes interpenetrate and intermingle to give rise to an immediate and primary feeling of movement. (1980, 199; emphasis in original)

The beginning pianist reads the score like an instruction manual. Play in a certain key, crescendo here, decrescendo there. As she becomes more proficient and learns to read between the lines, the limitations of the score become more and more apparent. The score can never be anything more than a crude approximation of what originally inspired the composer, and as the pianist deepens her understanding through practice, the point of reference shifts from the score itself to that which lies between the lines, as it were, to the relationship between the inner world of the composer and that of the pianist. True knowledge only exists when the music is being played and heard, when it captures the whole web of past inspiration, anticipated future, and the limitless present consisting of composer, soloist, orchestra, and audience.

The distinctions of discursive consciousness in general are only partial, crude approximations of reality. For the Buddhist, one must move beyond the limits of discursive notions of "mountain" to a subtler level of awareness in order to truly see the mountain. For Bohm, the models and formulations of theoretical physics occur at the explicate level of a reality. By refining these models and formulations in light of the implicate whole, one can gain ever more subtle understandings of the work of physics and physicists:

> This activity of consciousness [described in terms of listening to music] evidently constitutes a striking parallel to the activity that we have proposed for the implicate order in general .... [In our] model of [the] electron ... at any instant, there is a co-present set of differently transformed ensembles which inter-penetrate and intermingle in their various degrees of enfoldment. (1980, 199)

One of the differences between the case of the Buddhist and that of Bohm's theoretical physicist is that the former aims for embodied realization while the latter by definition restricts his work to the realm of the intellect, however subtly it may operate, and therefore he never comes to know the implicate order as such. In this sense, the following distinction that Bohm makes between the case of listening to music and of doing physics seems to parallel that between the seasoned Buddhist practitioner and the practitioner of physics:

> The key difference in these two cases is that for our model of the electron an enfolded order is grasped *in thought*, as the presence together of many different but interrelated degrees of transformations of ensembles, while for the music, it is *sensed immediately* as the presence together of many different but interrelated degrees of transformations of tones and sounds ... . In listening to music, *one is therefore directly perceiving an implicate order.* Evidently this order is *active* in the sense that it continually flows into [the explicate order] of emotional, physical, and other responses. (1980, 200; emphasis in original)

Regardless of these differences between Bohm's physicist and the accomplished Buddhist practitioner, they share the basic view that the fullest understanding occurs when mind and matter, self and other, are grasped in their wholeness or emptiness beyond or before discursive notions have taken hold. In such a world, Bohm tells us, "it will be ultimately misleading and indeed wrong to suppose, for example, that each human being is an independent actuality who interacts with other human beings and with nature. Rather, all these are projections of a single totality." (1980, 210) From a Bohmian perspective, then, the anthropic principle only shows that, when scientists push the limits of the separation of mind from matter upon which their scientific objectivity rests, they are in fact made to face the inseparability of mind and matter, or their mutual enfoldment in the implicate order.

This stands in great contrast with Barbour's participatory view of the human and the divine in which, despite their mysterious interaction, the two stand as autonomous and separate in their own realms; in this view, the anthropic principle supports not the collapse of the mind-matter, human-divine distinction but in fact supports their relative autonomy *indirectly*. The participation of the scientist in the discovery of his own necessity ties him ever closer to God without knowing the divine *directly*.

Barbour and Bohm articulate their views of the mind-body problem in light of diverse epistemological assumptions concerning the mind and its relation to its objects, and this leads to diverse metaphysical conclusions concerning the nature of the human mind and its relation to ultimate reality. For Barbour, ultimate reality lies with God, a God who evokes the devotion and faith of the believer who, in his mysterious separation from and participation in God, follows his Leader's guidance in embarking on a life of religious creativity. Barbour's process theology follows the classical Western sense of metaphysics as an articulation of that which transcends and encompasses the empirical, physical universe, and does so speculatively, informed by critical reason. Bohm's holistic philosophy of the implicate order proposes that ultimately, the metaphysical whole will only yield to a nondualistic knowledge or cognition that is realized in the here-and-now, an immediate knowledge that forever eludes propositional, discursive reasoning due to the very structure of the mind-matter nondualism that constitutes its epistemological and ontological basis.

It is worth noting that Barbour considers Bohm's holistic paradigm to be monistic. According to Barbour, "Here is the ultimate monism that contrasts with the greater pluralism of Western religions and of process theology. For Bohm, the answer to the fragmentation of personal life is the dissolution of the separate self, rather than the healing of brokenness by the restoration of relationships to God and the neighbor that Christian thought advocates." (1997, 190)

While Barbour is accurate in describing the dissolution of the separate self in Bohm's view, it is not a dissolution that ends in absolute monism. This is because it cannot be reduced to a monism that stands in contrast with dualism. Barbour's formal reliance on Aristotelian logic and the law of the excluded middle requires that he reduce Bohm's logic to discursive terms that Bohm's own logic, shaped by the nondiscursive logic of the Indian tetralemma, does not. To put it in Barbour's terms, for Bohm, the wholeness of the implicate order is both monistic and dualistic, because its wholeness is manifest in the empirical realm of diverse phenomena, such as can be seen in the anthropic principle. Yet, it is neither monistic nor dualistic, because it cannot be grasped propositionally.

4 *What Is the Relation between Past, Present, and Future?*

In a well-known passage from the "Genjokoan" chapter of his *magnum opus*, the Shobogenzo, the Zen Buddhist master Eihei Dogen (d. 1253) writes:

> Once firewood turns to ash, the ash cannot turn back to being firewood. Still, one should not take the view that it is ashes *afterward* and firewood *before.* He should realize that although firewood is at the dharma-stage of firewood, and that this is possessed of before and after, the firewood is beyond before and after. Ashes are in the stage of ashes, and possess before and after. (1990, 55; trans. from Waddell/Abe: 1972, 136; emphasis in original)

When one goes out to cut firewood, prepares a fire, lights it, and it burns, turning to ashes, one is basing one's actions on a notion of linear time and causality, not the nondualistic causality of interdependent origination. The empirical world seems to confirm the irreversible view of time, since ashes cannot be turned back into firewood, and the firewood cannot be turned back into a living tree. However, Dogen states, "one should not take the view that it is ashes afterward and firewood before. He should realize that firewood is 'beyond before and after.'" This means one should relate to the firewood nondualistically and see it in its emptiness or suchness. The difference between the two modalities of cognition is that, in the first instance, one perceives the firewood from an ego-centered, utilitarian perspective, as being *for myself.* However, when I see the firewood without imposing my preconceptions on it, I see it as a manifestation of the oneness of the cosmos. More precisely, the cosmos sees itself as the firewood through my eyes. In that moment, the firewood is most vividly and truly the firewood, yet it is not "firewood" at all, since the very notion of firewood is a finite, biased notion based on my ego-centered preconceptions.[7]

[7] This view of the finite world is reflected in one of Dogen's verses in the "Zazen Shin" chapter of the Shobogenzo: *Kukatsu toten nari, tori tonde tori no gotoshi* ("The bird flying through the empty sky is like a bird") (Dogen: 1990, 251).

For Dogen, and for much of Mahayana Buddhism, time and its components – past, present, and future – are conventional truths tied to human desires and expectations, not hardwired realities that are intrinsic to the universe. Ultimately, the sense that time flows unidirectionally from past to present to future itself is predicated on a one-sided view of time. Freed from this one-sided view of time, time may flow from present to past as easily as from past to present. According to Shunryu Suzuki, a modern-day interpreter of Dogen,

> Time constantly goes from past to present and from present to future. This is true, but it is also true that time goes from future to present and from present to past. A Zen master once said, "To go eastward one mile is to go westward one mile." This is vital freedom. We should acquire this kind of perfect freedom. (1970, 34)

However, this does not deny that, conventionally, time flows from past to present only, from firewood to ash only, and not vice versa. At the deepest level, however, there is no discursive time, and yet all of time exists as an infinite potentiality that may be expressed at the conventional level of truth as past-present-future, but also future-present-past.

Nevertheless, the practical problem of linear time and causality remains. No matter how I might experience the "firewood" in this nondualistic manner, I somehow cannot escape the sense that once it is ashes, it will not turn back into firewood. Thus, my sense of linear causality seems irrefutable. From Dogen's Buddhist perspective, this view is based on suspect philosophical assumptions. The fact that I view the firewood in this manner must be seen in light of the fact that I see an essential distinction between firewood as a source of fire and ashes as incapable of producing fire. This in turn is based on a one-sided view of existence: I need the fire to boil water for my meal. Again, this is based on my desire for survival, and this in turn on an *assumed* distinction between life and death. Yet, from the nondualistic perspective, the distinction between life and death is illusory. The whole notion of linear time and causality is based on a mistaken notion of essentialized distinctions at the foundation of existence. A stone does not know life or death. A tree does not consider itself to be living and then dying. Does a butterfly define its own life and death? Only human beings arbitrarily attribute ontological status to the boundary between life and death, extending this view to inanimate objects such as stars, believing that stars also are born and die. Thus, Dogen continues the passage cited above with the statement,

> Just as firewood does not revert to firewood once it has turned to ashes, man does not return to life after his death. In light of this, it being an established teaching in Buddhism not to speak of life becoming death, Buddhism speaks of the unborn [emptiness]. It being a confirmed teaching that death does not become life, it speaks of non-extinction [oneness]. (1990, 251)

Despite all of this, the practical problem remains. Without firewood (in the cold winters of thirteenth-century Japan), Dogen would have died. In order to be true to his vision of reality, should he abandon discursive causal thinking and simply meditate until he becomes one with the world of emptiness? This is a complex question whose full examination is beyond the scope of this chapter, but there are a few key points that may be helpful to consider. First, if he thinks that he should abandon his attachment to life by choosing death, this would be nothing more than a delusion, since he remains trapped within the realm of the discursive intellect. Second, by coming to see the firewood in light of the two-fold truth of form (linear distinctions) and emptiness (beyond before and after), his attitude towards the firewood is transformed in subtle ways. As he is chopping the firewood, he becomes one with the chopping, becomes the chopping activity itself as a manifestation of emptiness. His sense of intimacy with and vivid awareness of the piece of wood, the surrounding forest, nature, and the cosmos as a whole is thereby intensified. That is to say, he continues to live in the world of distinctions but is not of it. His physical survival may depend on the firewood, but his spiritual center transcends it.

5 The Delayed Choice Experiment: Bending the Direction of Time

In the foregoing discussion of Barbour's process theology and Bohm's implicate order, the application of their ideas to the anthropic principle results in opposing conclusions because their basic epistemological and methodological assumptions differ. Their conclusions appear to be counterintuitive to one another, and one begins to understand why only when the underlying assumptions are excavated. For those who share the basic assumptions driving either view, this discussion may help to explain why the alternate approach arrives at an opposing view, but the result remains counterintuitive. Many findings in theoretical physics are counterintuitive to our common sense, especially when one enters the realm of quantum theory, because the basic underlying assumptions differ between our common sense view of reality and the quantum mechanical view.

One of the most vexing phenomena is the collapse of the wave function in the classical double slit light experiment. When light passes through two slits and is made to project on a piece of photographic film, it creates an interference pattern like two waves meeting each other that have emanated from two points on the surface of a pond. This demonstrates the wave nature of light. However, if photon detectors are placed next to the slits immediately after the light passes through them, then the detectors measure the passing of individual photons through the slits, and no interference pattern occurs. Rather, the film records clusters of photons, as indicated by

the photon detectors. It is highly counterintuitive to our common sense that the act of observation can change the nature of the phenomenon being measured even though the source and path of light remain unchanged.

John Wheeler took this a step further by introducing the element of time and proposed what is known as the "delayed-choice experiment."[8] In this experiment, one considers the same double-slit experiment carried out on a cosmic scale. The equivalent of the double-slit screen can be provided by the gravitational pull of a large celestial body like a galaxy and an enormous, distant light source like a quasar. The effect of the galaxy upon the light emitted by the quasar is like that of the two slits in the aforementioned screen. Just as water passing through the slits would form two points from which waves would emanate, the light bending around the two opposing sides of the outer periphery of the galaxy would form waves producing interference patterns upon their arrival at a piece of photographic film on planet earth. Why such a large-scale version of the same experiment? Because the light arriving on planet earth would be so old and from such a distance that it would be extremely faint, so faint in fact, that in its particle mode, the light would arrive as slowly as one photon at a time at the photon detector.

The experiment set up in this manner brings into relief the problem of time in the collapse of the wave function. In its wave function, the light would produce an interference pattern, just as in the double split experiment. "Here is the odd part, ..."

> By the time the astronomers decide which measurement to make – whether to pin down the photon to one definite route or to have it follow both paths simultaneously [to create the wave interference pattern] – the photon could have already journeyed for billions of years, long before life appeared on Earth. The measurements made now, says Wheeler, determine the photon's past. In one case the astronomers create a past in which a photon took both possible routes from the quasar to Earth. Alternatively, they retroactively force the photon onto one straight trail toward their detector, though the photon began its jaunt long before any detectors existed. (Wheeler: 2002, 66)

Since Wheeler first published his idea of the delayed-choice experiment in the 1980s (Wheeler: 1983), scientists have found several ways to scale down the experiment and confirm his essential theoretical points several times over, with the most recent findings published in 2007 (Jacques et al.: 2007).

This means that Wheeler's theory, that the past reality of light is determined in the present, has been experimentally confirmed. Time is not unidirectional, moving from past to present to future, but may also move from present to past. Now, once the past is fixed in the present, those results

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[8] Wheeler: 2002; the discussion of the "delayed choice experiment" is taken from this article.

cannot be changed. However, the movement of light transmitted from an event occurring in the present may again be determined at some indeterminate future, rather than what is occurring now. This is just one experiment among others that raises the problem of the direction of time and the role of the observer in determining the course of events, not just in the present and in the future but also in the past (Gribbin: 1984).

Physicist Andrei Linde, commenting upon the delayed-choice experiment, emphasizes the role of consciousness in determining past events, as Wheeler explains:

> Linde believes that conscious observers are an essential component of the universe and cannot be replaced by inanimate objects [such as a photon detector independent of the observing scientist]. "The universe and the observer exist as a pair," Linde says. "You can say that the universe is there only when there is an observer who can say, Yes, I see the universe there. These small words – it looks like it was here – for practical purposes it may not matter much, but for me as a human being, I do not know any sense in which I could claim that the universe is here in the absence of observers [and not just observation] … . I cannot imagine a consistent theory of everything that ignores consciousness." (2002, 67)

From Newtonian mechanics to Einsteinian relativity and quantum uncertainty, the discipline of physics, established upon an objectivity defined over against the subjective bias of the scientist, as it sought to be ever more objective, has paradoxically found itself at each stage increasingly having to account for the role of the observer.

Ian Barbour, however, representing a view taken by a number of physicists, disagrees with the notion that consciousness or the mind of the observer plays a role in the determination of reality, including that of time:

> I do not find these interpretations of quantum physics convincing. Surely it is not mind as such that affects observations, but the process of *interaction* between the detection apparatus and the microsystem. The experimental results might be automatically recorded on film or on a computer printout, which no one looks at for a year. How could looking at the film or printout alter an experiment that has been recorded for a year? The Wheeler view seems very strange, for observers of the Big Bang are themselves products of the evolution of the cosmos, which included billions of years when there was no human consciousness. (1997, 186)

Remarkably, through all of the twists and turns of time, the many versions of time and timelessness found in physics, Barbour appeals to the simple, unidirectional, objective view of time in accord with his own epistemic and ontological assumptions.

As in the case of the anthropic principle, the delayed-choice experiment may be interpreted as more consistent with either the nondualist perspective of Dogen and Mahayana Buddhism or with the dualist account of Barbour and process theology. Dogen might not disagree with Barbour that

the inanimate universe long preceded the emergence of human beings, but for the Zen Buddhist philosopher, this is a limited view taken at the level of conventional truth. Barbour does not disagree that there is an interaction between observer and observed, but there is for him an ontological boundary that cannot be crossed, a hard line between mind and matter. Interaction occurs, yes mysteriously, but precisely because there is ontological difference. In contrast, for Dogen, and for Mahayana Buddhists generally, emptiness and its correlate interdependent co-origination define a paradigm where interaction occurs precisely because there is no ontological boundary in emptiness between mind and matter; self and other; past, present, and future.

6 *In Conclusion*

Buddhists and Christians generally agree on many things, such as ethical responsibility for human beings, animals, and the environment; the need to address specific issues of global conflict, famine, and climate change; the benefits of interreligious dialogue and even collaborative efforts where appropriate. However, they may have quite different understandings of just what these things may mean, how science and technology should be understood in relation to these issues, and the means and methods for tackling the numerous practical problems facing the world. That is because basic assumptions about how they view the world, know the world, and consequently what the world is may differ considerably.

Although the strange and obscure world of theoretical physics may seem far removed from the urgent problems facing thoughtful religious persons around the world, delving into them may be helpful and even necessary for understanding where each of us stands in relation to the world before us, known and unknown, near and far, self and other.

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Chapter 6
Constrained by Boundaries

Paul O. Ingram

1 Introduction

Much of the discussion in current science-religion dialogue has focused on "limit" or "boundary" questions, meaning questions raised by science but not answered by science. Boundary questions arise because of (1) the intentional limit of scientific methods of investigation to extremely narrow bits of physical processes while ignoring wider bodies of experience, and (2) the resulting incompetence of scientific methods when applied to aesthetic, moral, and religious experience. In the sciences, boundary questions constitute methodological and conceptual constraints. For example, standard Big Bang theory about the origin of the universe imposes a temporal boundary that constrains what scientists can know about the universe. Why is there a universe at all? The standard response is that cosmologists can describe *how* the universe originated with a high degree of probability, but are ignorant, or at least agnostic, about *why* the universe exists. Here a boundary question generated by the application of scientific methods in cosmology creates a metaphysical question cosmology is incapable of answering. Whenever this happens, an opening is created for science-religion dialogue.

This situation runs throughout the various disciplines of science and is the reason Thomas Torrance concludes that the sciences reveal a natural order that is both rational and contingent, whose laws and initial conditions were not necessary, so that the combination of contingency and intelligibility energizes a search for new and unexpected forms of rational order. Consequently, Torrance argues, boundary questions encountered in the sciences reveal a religious dimension. He concludes that "correlating the rational order discovered in the sciences with God goes far to account for the mysterious and baffling nature of the intelligibility inherent in the universe, and explains the profound sense of religious awe it calls from us and which, as Einstein insisted, is the mainspring of science." (1979, 347) Similarly, Catholic theologian David Tracy (1975) maintains that the intelligibility of the universe requires an ultimate rational ground, which is God. Buddhists, however, draw a different conclusion that expresses Buddhism's non-theistic character – the mix of intelligibility and contingency

in nature is just a "fact" that requires no explanation in terms of origins. Here, we encounter an example of a scientific boundary constraint that elicits two opposite religious responses.

But boundary questions are not limited to the natural sciences. Religious questions incapable of complete solution through the application of theological or philosophical methods arise at the boundaries engendered by what Joseph Campbell referred to as the "universals of human experience," meaning experiences human beings undergo no matter what their cultural or religious context, but which are nevertheless contextualized by specific cultural and religious contexts. For example, the universal experience of suffering raises the theodicy problem for classical Christian theism. How can a loving, omnipotent creator of the universe permit unmerited suffering? Here, the assertion of God's creative power and love creates a boundary question Christian theology cannot resolve apart from rethinking the nature of God, as in process theology (Cobb/Griffin: 1976, 118–124).

Anxiety and confrontation with death, as well as experiences of beauty, joy, and trust are other universals of human experience. Buddhists and Christians theoretically interpret these experiential universals according to their particular texts, doctrinal formulations, and practices. But in similarity with the natural sciences, all religious constructs are historically and culturally bounded. Which means that as in the natural sciences, they are also theory laden, so that neither Christian theology nor Buddhist philosophy can legitimately claim certain or complete knowledge. What, exactly, is the nature of God? What, exactly, is Awakening? The standard Christian and Buddhist response is that God and Awakening are ultimately beyond human thought because both transcend anything human beings can imagine them to be, or not to be.

However, boundary constraints do not imply that significant and reliable knowledge is impossible in the sciences or in Buddhist and Christian thought. To conclude that scientists, Buddhists, or Christians cannot achieve complete knowledge via scientific method, Buddhist philosophy, or Christian theology because of boundary constraints does not imply that the sciences have not amassed an incredible body of reliable knowledge about physical reality, or that Buddhists or Christians have not accumulated large bodies of reliable knowledge about the structures of human existence. Accordingly, my thesis is that the boundary constraints confronting working scientists and practicing Buddhists and Christians constitute a reliable foundation for a "trilogue" between the natural sciences, Buddhism, and Christianity. Establishing this thesis will require a closer examination of the specific sources of the boundary constraints in the natural sciences, Buddhism, and Christianity.

2 *Boundary Constraints in the Natural Sciences*

Whether there exists an overall scientific method is an open question since the actual methods of physicists, evolutionary biologists, engineers, and social scientists are quite diverse. In general, scientists mix observation, theory, and inference to the best explanation of the data. But there are nuances in this mix that are quite complex, a point made by Holmes Rolston III (2006, 2). Furthermore, scientists never "prove" anything. They make falsifiable hypotheses and generate theories to support these hypotheses. But the ways in which this is done are not identical in the various scientific disciplines. Unless the pluralism inherent within scientific methods is appreciated, one cannot profitably ask how far religious methods of inquiry differ from scientific methods or whether dialogue between science and religion in general, or a science-Buddhist-Christian trilogue, is possible.

Typically in scientific explanation of physical processes, hypotheses and theories arise out of physical facts followed by deduction back down to further levels of empirical expectations, those then being related back to observations to confirm or disconfirm the theory or to generate a revised theory, from which new conclusions are drawn, after which the facts are again consulted. This is why every scientific theory has a developmental history. Its "facts" are "contextual truths," just as they are in Buddhist philosophy and Christian theology. To conclude that theory and fact can be isolated from each other is, according to Rolston (2006, 3), to believe in "the dogma of immaculate perception."

That scientific explanations generate boundary constraints can be illustrated in contemporary physics and biology. In physics three fundamental constants can be used to measure the scale of physical phenomena: (1) the Planck constant, h, which measures the scale of quantum effects, (2) the speed of light, c, which sets the scale of the effects of relativity, and (3) Newton's constant, G, which is a measure of the strength of gravitational effects. Max Planck at the beginning of the twentieth century showed that these three constants may be combined to produce the fundamental units of length, time, and mass known as: (1) Planck length, approximately 10^{-33} centimeters, (2) Planck time, approximately 10^{-45} seconds, and (3) Planck mass, approximately 10^{-5} grams (see Heatherington: 1993, 419). In quantum theory, Planck's constant sets limits to our knowledge of microphysical realities at the quantum level. In relativity theory, the speed of light sets limits on our knowledge of large-scale physical realities. Even in Einstein's special theory of relativity – although he disliked the indeterminacies imposed by Planck's constant – there is an indeterminacy, namely, the impossibility of getting information across great distances because nothing is faster than the speed of light. This means scientists can never observe anything as it is, but as it was. We cannot observe the sun as it is, but as it was eight minutes

ago. Astronomers cannot observe the center of the Milky Way Galaxy as it is, but as it was two million years ago. The nearest galaxy cluster to Earth cannot be observed as it is, but as it was eight million years ago.

So, as quantum theory leads to the incorporation of an observer into the observation of the very small, in relativity theory the constancy of the speed of light relates observers inseparably to any astrophysical or microphysical world scientists can observe. This creates deep mysteries in science. Quantum theory and relativity theory have paradoxically revealed what must be true of physical reality. That is, they approximate in non-anthropomorphic terms what is the case in nature as they simultaneously prevent us from knowing these realities absolutely, independently of the knowing mind, which is one of the philosophical implications of Heisenberg's uncertainty principle. Yet between the very small and the very large, scientific method yields real knowledge of real physical realities capable of revision or rejection according to new evidence and/or new paradigm shifts.[1]

This mystery was revealed in 1927 by Werner Heisenberg. An electron's position and momentum cannot be determined simultaneously. Even when the intensity of light is lowered or a sensitive light detector is employed, there is a small photon impact on the electron being measured. As the intensity of the light is decreased, the number of photons emitted is decreased. Once an observer gets down to a single photon, light cannot get any dimmer without actually turning off. This physical fact creates a genuine quantum limit because there is always a disruption of an electron's momentum, no matter how minimal, when its position is measured, or of its position when its momentum is measured. According to Planck's constant, the energy of a single photon is proportional to its frequency, which in turn is inversely proportional to its wavelength. By using lower and lower frequencies (lower and lower energies but larger and larger wavelengths) an observer can produce gentler and gentler effects on the electron's momentum. But here's the catch. When photons are bounced off an electron, the information received is only enough to determine the electron's position within a margin of error equal to the wavelength.

Consequently, physicists are faced with a quantum-mechanical balancing act. An observer using high-density frequency (short wavelength) light on an electron can determine its position with statistical precision, never with complete accuracy, because high-frequency photons are very energetic and disturb the electron's momentum. Low-frequency light minimizes

[1] This is why most working scientists are "critical realists," according to Ian Barbour. Critical realism is an epistemology that asserts that scientific hypotheses and theories refer to objectively real physical processes existing objectively to the observing scientist that are capable of falsification, revision, and rejection as new evidence comes to light (see Barbour: 1990, 106–110).

the impact on the electron's momentum because the constituent photons have comparatively low energy, which means that precision is sacrificed in determining the electron's probable position.

Here is Heisenberg's point. The fact that an electron's position and momentum cannot be known with total precision also applies to all the quantum constituents of nature. In other words, "uncertainty" resides in nature, not in the minds of observing particle physicists, which is known as the Copenhagen Interpretation of the Uncertainty Principle and is now the view of most physicists (Heatherington: 1993, 114 f). Observation always includes a relationship to an observer, so that at the quantum level not a single one of the Newtonian primary quantities survives as an absolute. Mass, velocity, length, time – all those quantities that Newton thought could be measured objectively, independently of the observer – have become secondary. They are relative to an observer, altered by the observer's frame of reference, and therefore not absolutely quantifiable or knowable. Consequently, between the very small and the very large, scientific knowledge is statistical, which does not imply that scientific knowledge is unreliable.

This is as true in evolutionary biology as it is in physics. According to Rolston:

> Evolution has built a program into the individual organism, and by reproduction these individual programs are passed across generations by means of coded genetic information stored in DNA molecules, *But is there any program built into evolution*? Does the process that produces evolution *itself* possess a "program" or directionality or a "purpose"? If so, what is the *meaning* of "purpose" in the evolutionary process as such that transcends and yet is immanent within all living organisms? (2006, 90; emphasis added).

Evolutionary biology is perhaps the most revolutionary theory introduced by the sciences, even more revolutionary than relativity and quantum theory because of the scope of its reach across multiple disciplines – ranging from genetics and the neurosciences, to medicine and psychology, to disciplines within the social sciences, for example, cultural anthropology and demography – and the insights it gives into biological process and history. What drives evolution is natural selection, and what drives natural selection is genetic mutation. In its simplest version, natural selection states that only the fittest survive, "the fittest" defined as "those who survive." Although natural selection heuristically helps us to understand the origins of life forms, the theory is circular in structure. Charles Darwin thought of natural selection as a hypothesis in need of observational confirmation, but it turns out on closer inspection to be a tautology because the theory's premise is also the theory's conclusion.

Nevertheless, natural selection is true in that on average the less fit never survive. But natural selection does not go far enough because many, per-

haps most, of the interesting developments in evolution have little to do with natural selection. For example, nothing in evolutionary theory allows biologists to predict a long-term increase in complexity. Natural selection asserts only the survival of the more fit. But evolution takes place whenever there is any change in gene frequency and has nothing to do with increasing complexity. There can be, and are, wanderings up and down the ranges of life's complexity.

A scientific theory is often tested at the extremes, and its breakdown may reveal its partial scope and often suggest a larger theory under which it might be subsumed. The extremes of evolution by natural selection are (1) the genesis of life, and (2) the genesis of mind. At the earliest stages of life it is necessary to explore not so much the origin of life by natural selection as the origin of natural selection itself. Was there some sort of natural selection already at work in the start-up of life from non-life? Here, biologists are as limited as cosmologists in being unable to describe the Big Bang at $t = 0$. Prior to Planck time, 10^{-47} seconds after the Big Bang, the four fundamental forces (strong and weak nuclear forces, electromagnetic force, and gravity) that constitute the universe in their present interactions were interrelated quite differently. Because physicists have not, as yet, been able to experimentally reproduce whatever physical interactions between the four forces were happening prior to Planck time, what exactly occurred between $t = 0$ and Planck time remains a mystery.

Similarly, the historical pathways from non-biological matter to coded self-replicating DNA molecules are not known by biologists. Yet there is wide agreement among physicists and biologists that the emergence of life is inevitable from Planck time. If this is true, life seems destined to be an important part of the narrative story of the universe itself even though the exact routes life will take are open and subject to historical contingencies. The hiccup is that none of this is explained by natural selection in its usually hard-nosed accounts couched in the language of metaphysical materialism. Materialist explanations of the theory of natural selection commonly de-emphasize the randomness of evolution, while simultaneously leaving us deeply mystified about the inevitability and indeterminacy in the physical-chemical systems that eventuate in life.

Here's how. Materialist explanations of natural selection leave the evolution of human brain and mind unexplained. In fact, there are no satisfactory explanations for the arrival of the enormously complicated human brain, the most complex structure in the universe that we know. Certainly, brain power is selected because of its survival power. But once the human brain is in place, it is good for so much more than mere survival. At this point cognitive scientists encounter the problem of mind and its connection to the physical processes going on in the brain – as well as perhaps in non-human species. Stuck in a materialist metaphysics and a determinist epistemol-

ogy, the biological sciences are currently unable to give a coherent account about how mental processes can emerge from the physical processes going on in the brain.

Furthermore, while natural selection explains much, it cannot predict. In particular, natural selection does not allow biologists to say, after the events, why particular events happened and why other events failed to occur. Mutations occur randomly, but there exists no principle for selecting complex organisms. There is only the explanation that organisms that survived are fit for survival. But even in a randomly open system it is reasonable to expect that evolutionary theory should be capable of explaining the origins of complex living organisms and systems. If none of the complexities of life – for example mental and subjective experience – are derivable from the theory, then the theory is not doing any significant explaining.

Finally, natural selection as a universal principle (only the best adapted survive) never entails the survival of any particular living organism (like horses, for instance), not even when given initial conditions (microbes, trilobites). Natural selection does not reveal the outlines of natural history because (1) it does not sufficiently explain what did or did not happen over long periods of time, and (2) it describes end results of the evolutionary processes but does not explain the "how" and "why" of these processes. How and why did vertebrates occupy dry land? How and why did mammals follow dinosaurs after the dinosaurs became extinct? How and why did learning evolve from instinct? How and why did sentience follow reflex? How and why did culture follow nature? Natural selection does not explain how order steadily emerges out of chaos in the process of evolution or the emergence of mind. Nor does the randomness of natural selection through genetic mutation explain how a single cell at the beginning of the evolutionary process evolves into the spectacular array of living species, ranging from tiny fleas to blue whales, from ferns to California redwoods. In fact, recent research in a field of biology known as "developmental biology" or "evo-devo" indicates that the evolution of complex new forms does not require many genetic mutations over time or new genes. Instead, new forms can be explained by simpler processes requiring no more than "tweaks" in an already existing "hierarchy of genes."[2]

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[2] In fact, the *New York Times* recently reported on a possible paradigm shift that may well be underway in evolutionary biology that challenges the theory of survival of the fittest through the transmission of genes from one generation to the next in a species. Natural selection through genetic mutations does not explain how genes produce bodies. Recent discoveries in a rather new field called developmental biology, or "evo-devo," indicate that bodily development is controlled by a hierarchy of genes, with master genes at the top controlling a next tier of genes, controlling a next and so on. These genetic hierarchies not only favor the evolution of certain bodily forms but also disallow the growth of others, determining what can and cannot

The point of these observations is not that evolutionary biology should be abandoned, but that evolutionary theory needs to be reformulated. Biology now stands where physics once stood in the Newtonian age, and its Einstein has yet to appear. When this reformulation of evolutionary theory happens, as the determinism in Newton (which had so troubled religion) vanished with the advent of contemporary physics, so randomness and directionlessness (which now in biology troubles religion) will vanish in some biology of the future. "Every big step that science has so far taken teaches us that present theories are approximate and valid under limiting conditions, telling us less than the whole truth, and evolutionary biology is no exception." (Rolston: 2006, 121)

3 Boundary Constraints in Buddhism

When I teach undergraduate courses in history of religions I often point out that religious human beings, wherever one finds them, inhabit the same world and face the same universals of human experience that are a primary source of self understanding, communal understanding, and religious experience. All human beings experience hunger, fear, joy, hope for the future, sexuality, and death. All religious human beings think honesty is better than dishonesty and that the life they experience is more than what is given in empirical experience, that this isn't all there is. To a degree not experienced by other sentient beings on Planet Earth, human beings are capable of stepping back from these experiences to think about them even when they do not at a given moment directly experience what they are thinking about. What religious persons are looking for are meanings, meanings which often have little to do with mere physical survival of the fittest.

It is at this point of the discussion that my students usually asked something like, "Given the universals of human experience and that human beings inhabit the same world, why are there so many religions?" My usual reply is, "Do you really think the world is the same world for all human beings? Or is what we call a 'world' a theoretical construct that is culturally and historically specific?" It is at this point that I employ my spectacles metaphor as a pedagogical device to illustrate the function of worldviews in human self and communal understanding.

One can think of the religious traditions of humanity as varying kinds of spectacles through which people look at the world and reflect on the universals of human experience in their quests for meaning within specific cultural contexts. Looking at the world through a pair of Buddhist spectacles –

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arise not only in the course of the growth of an embryo, but also the history of life itself. See the Science Times section of the *New York Times*, 26 June 2007, D1–D7.

through the pluralism of Buddhist history, practice traditions, and doctrines – Buddhists accurately apprehend what is there to be apprehended, but never completely. Place a pair of Christian spectacles over one's eyes, one apprehends a similar world and meanings even as these spectacles block out distinctively Buddhist meanings and interpretations – as Buddhist spectacles do not allow Buddhists to apprehend distinctively Christian meanings. The world looks different when viewed through different worldview spectacles. So what Buddhists see is there to be seen; what Christians see is there to be seen. For that matter, what scientists "see" is there to be seen. But no religious tradition or scientific theory "sees" everything there is to seen or apprehended. All human beings apprehend the world darkly through their worldview spectacles, even when one's spectacles include Christian and scientific optics or Buddhist and scientific optics.

Of course all metaphors break down when pushed too far. So I very quickly try to get to the point I am trying to make to my students about religious pluralism: as in the sciences, all religious traditions are culturally and historically theory laden. The boundary questions that constrain Buddhist and Christian understanding of reality originate in the distinctive particularities of Buddhist and Christian worldviews.

Buddhist tradition is hard wired to a specific worldview in a way other religious traditions are not. Change or delete any item from this worldview, Buddhism ceases to be Buddhism. All schools of Buddhism, in their own distinctive ways, are theoretical interpretations of this worldview. Foundational to this worldview is the Buddha's teaching that all existence is implicated in suffering and impermanence (Sanskrit, *duhkha* and *anitya*); that we cause suffering for ourselves and others by clinging (*tanha*) to permanence in an impermanent universe; that release from suffering is possible; that the Noble Eightfold Path is the ethical and meditative practice that leads to the cessation of suffering and the achievement of Awakening (Nirvana).[3] Crucial to the Buddha's teaching about the structure of impermanent existence for not only all sentient beings, but also the entire universe, are the doctrines of interdependence (*pratitya-samutpada*) and non-self (*anatman*). Non-self means that all things and events at every moment of space-time are constituted by the ceaselessly changing interrelationships things and events undergo from moment to moment of their existence. There exists only interdependent relationships undergoing ceaseless change and becoming. Or in more Buddhist language, all things and events at every moment of space-time are constituted by the process of *pratitya-samutpada* or interdependent co-arising.

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[3] The particular items included in the Noble Eightfold Path are right viewpoint, right aspiration, right speech, right conduct, right livelihood, right effort, right concentration, and right mindfulness.

These doctrines are presupposed in every aspect of Buddhist teaching and practice even as they are nuanced differently in the various schools of Buddhism. Applied to human beings, for example, non-self means that we are not embodiments of an unchanging self-entity that remains self-identical through time. All Buddhist teachings are firm in their rejection of permanent self-hood. What we "are" is a system of interdependent relationships – physical, psychological, historical, sociological, cultural, spiritual – that, in interdependence with everything else undergoing change and becoming in the universe, continuously create "who" we are from moment to moment in our lifetimes. We are not permanent selves that *have* these interdependent relationships; we *are* these interdependent relationships we undergo. Since these relationships are not permanent, neither we nor anything else in the universe is permanent.

Buddhist conceptual dialogue with the natural sciences, as is the Christian conceptual dialogue, is rooted in its particular worldview. One predominant assumption of this dialogue is that physics and cosmology pose few challenges to Buddhist doctrinal and practice traditions because of the non-theistic character of Buddhism's worldview along with the empirical nature of the meditative practices that are necessary for the achievement of Awakening. While Buddhism does not categorically deny the existence of God or gods, the worship of God or gods is typically viewed as a form of clinging to a permanent reality. The result of such clinging can only lead to suffering. Because Buddhism is non-theistic in this sense, Buddhists do not typically feel conceptually challenged by contemporary scientific cosmology and evolutional biology or by Christian theology. Buddhists are also particularly drawn to evolutionary biology because of their social engagement with environmental issues (see Lancaster: 1997; Ingram: 1997).

Many Buddhists are also deeply interested in the neurosciences. For example, David Galin (2003), who is a psychiatrist associated with the Tibetan tradition of Buddhism, argues that the "chaotic state" of Western accounts of the human self, particularly those in the neurosciences, are inadequate from the standpoint of Buddhist practice and doctrine. He points to the cognitive structure underlying day-to-day speech as a means of demonstrating that abstract thought is constructed of metaphors drawn from the elementary experiences of sensory perception and bodily movement. This creates large numbers of metaphoric systems, of which the world's religious traditions are examples, which in turn creates paradoxes in regard to ideas of the self and personhood. However, reframing concepts of self and person through the filter of Buddhist philosophy can, he claims, resolve these paradoxes because this stream of Buddhist philosophy bears some correlation with the experimental results of neuroscientific studies of the human mind.

Matthieu Ricard (2003) agrees. He was a Buddhist monk for twenty years and is one of the main French interpreters for the Dalai Lama. He

argues that the discoveries of mind/brain correlations via Western brain imaging technology depend not only on third person observations typical of scientific method, but also upon first person observations of mental processes that Buddhists claim to experience through their practice of meditation. The lack of first-person perspective in the cognitive sciences creates, he argues, an incoherency that can only be overcome by including the first person perspectives of Buddhists disciplined in the practice of meditation in scientific accounts of consciousness. On the other hand, Buddhism lacks a third person perspective because of its emphasis on first person meditative experience.

Furthermore, Buddhists who practice a Tibetan lineage often employ a "two-truth" epistemology that originated with the second century Indian Buddhist logician, Nagarjuna.[4] For example, B. Alan Wallace (2003) understands scientific theories and conclusions as pragmatic truths about the physical world. As such, scientific truths are "secondary truths" that in themselves shed no light on the nature of reality. "Absolute truth," however, is metaphysical and is named by Wallace, following Nagarjuna, Emptying (*Sunyata*). Emptying is the Absolute Truth to which Buddhas awaken through the practice of meditation. Therefore, Wallace concludes, it is an error to expect the natural sciences to solve issues of a metaphysical or religious nature, since they were never designed to probe such questions. David Galin agrees. As secondary truths, "the primary weakness of physics and the biological sciences is that they do not discipline the mind" (2003, 133) – a conclusion the majority of working scientists would not accept since they think the practice of science requires a disciplined mind.

Yet in spite of the fact that Buddhists do not typically experience the sciences as a challenge to Buddhist thought and practice, Buddhist dialogue with the sciences has in fact raised many boundary questions that deeply challenge Buddhism's worldview. For example, the notion that all living organisms have evolved through accidental forces of random mutation and natural selection in the struggle for existence seems to raise as many boundary constraints regarding fundamental Buddhist doctrines as it does for Christian theology. Is the teaching that since all sentient beings are interdependent, we should experience the suffering of others as our suffering and act to relieve suffering by non-violent expedient means, based on an illusion? In a universe where the Second Law of Thermodynamics seems to demand suffering and death as the price for life itself, does it make any sense to say we cause our own suffering by clinging to impermanence and that we can free ourselves of suffering by training ourselves not to cling to permanence? Does universal suffering have anything to do with clinging? If the universe really is pointless and without value, as Richard Dawkins (1995)

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[4] For an interpretation and translation of Nagarjuna's writings, see Streng: 1967.

and Jacques Monod (1972) assert, can Awakening mean anything more than becoming experientially aware of universal pointlessness? If the universe is valueless, what's the value of Awakening? Are compassion and non-violence merely fantasies? In a pointless and valueless universe, in what and for what can one reasonably hope? What is the connection between Buddhism's defining teachings and what the sciences are discovering about the physical processes of nature? Only Buddhists can answer these boundary questions. Seriously engaging in conceptual dialogue with the natural sciences might help Buddhists to widen the boundaries of Buddhist knowledge.

4 Boundary Constraints in Christianity

The worldview that underlies Christian faith and practice is monotheism, but Christian monotheism is not identical with Jewish or Islamic monotheism even though Christian tradition shares many similarities with Judaism and Islam. The distinctive feature of Christian theism is its focus on the life, death, and resurrection of a Jewish teacher who lived and taught on the fringes of the Roman Empire two thousand years ago, whom Christians revere as the incarnation of God. In the life, death, and resurrection of this man humanity met God, certainly not all that God is, but nevertheless God, within the rough and tumble of historical existence. The Christian claim is that human beings still encounter God incarnated in Jesus after his death through the Holy Spirit. This encounter, past, present, and continuing into the future, is what lures all things and events into a future reality called the Kingdom of God. This seems to be the starting assertion of the Apostles', Nicene, and Athanasian Creeds, as well as other creeds and confessions of the Christian tradition.

Figuring out the meaning of the incarnation has been, and still is, the central problem of Christian theological reflection. This reflection illustrates that there have always been multiple theoretical ways of skinning out the meaning of the incarnation, which also illustrates that apart from the incarnation Christian tradition ceases to be "Christian." Historically, this aspect of Christian theological pluralism has its roots in the first century arguments between the Apostles Peter and Paul about the relation of gentile converts to the early Jesus movement with regard to Jewish legal practices (Acts 15:1–20). Roman Catholic and Orthodox traditions are not identical in their theoretical interpretations of the meaning of the incarnation, and the theological traditions in the Lutheran and Reformed churches are even more pluralistic.

However, no Buddhist in dialogue with Christianity has written that "a Buddhist can be a Christian, too,"[5] the point being that Buddhism is locked

[5] John B. Cobb (1978) has written that "a Christian can be a Buddhist, too," provided one is careful in specifying what this means.

into the particular non-theistic doctrines of its worldview. Delete the doctrines of impermanence, non-self, suffering caused by clinging to permanence, and Buddhist non-theism, and Buddhism ceases to be "Buddhist." These teachings define what being "Buddhist" means in all traditions of Buddhist thought and practice. Accordingly, Buddhists have traditionally been more interested in socially engaged dialogue with Christian traditions of social activism than in conceptual dialogue with the defining doctrinal traditions of Christian faith and practice. A Buddhist cannot be a theist in a Christian, Jewish, or Islamic understanding of theism. Buddhists engaged in conceptual dialogue with the traditions of Christian theology have not felt the need to appropriate Christian theological teachings into Buddhism's worldview, as John B. Cobb (1975, 209 f; 1978; 1982, chapters 3 and 4), for example, has appropriated Buddhist doctrines of impermanence and non-self into his theology.

Some forms of Christian thought and practice are quite narrowly focused on the incarnation. An example is the Christian Right in America and other parts of the world whose interpretation of the incarnation does not allow them to apprehend the truth of not only non-Christian faith and practice, but also forms of Christian faith and practice other than their own. The theological theories of some of these movements also blind them to the truth of scientific descriptions of nature, particularly cosmological and evolutionary theory. Many conservative evangelical Christian traditions are also theologically exclusivist. Some versions of neo-orthodox theological theory are so focused on the universal meaning of the incarnation that they are incapable of apprehending the truth experienced by non-Christians. The lenses of theological liberals tend to be more open to the diversity of religious pluralism as valid avenues of truth about God so that liberals are more willing to engage in dialogue with non-Christians. Theological liberals also tend to be more open to dialogue with the natural sciences.

But the very openness of theological liberalism also runs the risk of uncritically diluting the distinctiveness of the incarnation. The theological issues are complex for all Christians because the object of the various theological interpretations of the incarnation is not only immanent within the conditions of history, but also transcendent. God, as Christian mystical theology never tires of pointing out, is beyond words, symbols, and theological speculation. Words, symbols, and theological speculation can point to, but never capture, the reality of God. Theologically, all Christians "see through a glass darkly" (1 Cor 13:12), which is another way of saying that the specifics of Christian thought and practice are theory laden. It is this fact that generates boundary questions that constrain what Christians can know: In confessing the incarnation of God in the historical Jesus as the Christ, Christians do not know what God "is" in any absolute sense because the incarnation does not exhaust what God "is." Christians can only

know God approximately. Yet as in the sciences and Buddhism, to say that Christians cannot claim complete knowledge does not imply that Christians know nothing. The point is that there are always boundary questions that constrain what Christians can know, which is why dialogue with the natural sciences and non-Christian traditions is such a theologically important enterprise for all Christians.

As Buddhists generally conclude that the sciences pose few challenges to Buddhist teaching and practice, many Christian theologians realistically acknowledge the challenges the sciences pose to Christian thought and practice and have intentionally engaged in dialogue with the sciences in light of these challenges (see Ingram: 2004). In general terms, what this dialogue has demonstrated is that if God is anywhere to be known, it will be as God "comes through" in space-time realities relative to our local existence, since according to the Prologue of the Gospel of John, God is, so to speak, incarnate locally. This need not mean that God is not absolutely there at all, but only that God is known in relationship because God, if God exists, and nature seem to share this much in common – each must somehow exist with real, objective attributes. But we have no direct access to either God's or nature's attributes except relatively as each is translated into local terms we can understand that can be stretched to grasp something more ultimate than we find in ordinary experience. Certainly atheists may have the conviction that only nature, not God, exists. But the epistemological problem is the same in both convictions: that of knowing something that transcends our experience and understanding. That the sciences have understood nature, however partially, should be encouragement that theology can deepen its understanding of God and God's interaction with the universe, however partially.

Many scientific conclusions are not observer dependent. Scientific conclusions and laws are invariant and do not depend upon a reference frame, although this means that detailed observations vary from reference frame to reference fame. Some of the physical constants of nature – the speed of light, the charge on an electron, the number of atomic shells, the periodic table, chemical reactions, and so on – will be the same for all observers. So there is considerable objectivity in relativity theory, quantum theory, and biological theory. Although measurements of space and time are relative to observers, many space-time measurements, which fuse the particulars of space and time in local places, are invariant between observers. There is also considerable unity: mass is unified with energy, space with time, gravity with acceleration. The very relativity of these interrelationships unifies them and objectively so. These features of nature remain quite real as phenomena even though they are interdependent with other phenomena. They do not exist intrinsically, but only interdependently – a point that is in harmony with Buddhism's worldview.

This is why theologians engaged in dialogue with the natural sciences usually conclude that the defining character of Christian theological reflection can be harmonized with scientific conclusions about natural processes. Physics and biology have removed nature from the phenomenal level of what human beings experience to a transphenomenal level, where nature is not visible, but only detectable. Nature is not unambiguously available to the imaginations of either scientists or theologians – or for that matter Buddhist philosophers. Nature is rooted in a realm out of immediate reach and only half-translated into our phenomenal experience, a region into which we gain assess by groping out of our familiar experiences. But since nature is already transphenomenal, why should it be judged incoherent when Christian theologians speak of God in a supraphenomenal way? Scientists, Christians, and Buddhists can stipulate only that they work back from relevant experiences on the phenomenal level, and then ask what hypothetical reality might constructively explain these experiences. This is the practice of critical realism as inference to the best explanation. For scientific, Buddhist, and Christian accounts of reality, what we clearly apprehend stretches away into what we dimly apprehend to what we cannot be pictured at all.

Consequently, "knowledge" is something that happens when reason infers the best explanation of what we experience. But experience never "proves" anything other than that one is experiencing. Furthermore, as Paul Ricoeur (1976, 48) argued, experience provides more ideas than we have words or symbols to express. Philip Hefner (2004), following Ricoeur's lead, argues that we have to stretch our words beyond their ordinary use to highly symbolic expressions in order to express the ideas our experience has generated because "meaning takes place in an ambiance that is richly textured – the 'more ideas we have than we have words' is a signal of the texture of our experience."

Knowledge, as previously noted, is also interdependent with faith in science, Buddhism, and Christianity. But "faith" is not identical with "belief" as used in contemporary English usage. A belief is an opinion about something we hold without sufficient evidence to say that "we know." Beliefs can be true, false, elegant, clumsy, or even express faith, but belief is different than knowledge and can never be faith or even engender faith. Faith is trust in something upon which one bets one's life, which in turn opens us to the possibility of knowledge. Or rephrasing St Anselm, we have faith, that is, trust, in order that we may know, whether one is a scientist, a Buddhist, or a Christian. The object of faith in the sciences is that nature has a rational structure that can be understood. Buddhists and Christians share this faith stance contextualized by the specific objects of Buddhist and Christian faith. But whether scientist, Christian, or Buddhist, once in a state of faith one is empowered to know, however partially, the nature of what has

grasped us as an "ultimate concern" (see Tillich: 1951, 11–15; 1957, chapter 1). In this sense, faith is the axiomatic foundation of knowing anything.

Of course, the object of faith – what we trust – is different in the sciences, Buddhism, and Christianity, although Buddhists and Christians can certainly be scientists. Scientists trust, but cannot prove, that the universe's physical processes are a rational structure that human beings can understand. Without this faith, science cannot proceed. Buddhists trust the underlying reality (the Dharma) that binds the whole universe at every moment of space-time into a web of interdependence – a conclusion that is supported by physics, cosmology, and evolutionary biology. Without this trust, Buddhist teachings and practices are incoherent. Christians trust that God incarnated God's self in the life, death, and resurrection of a historical human being named Jesus of Nazareth. All the pluralism of Christian faith and practice derives from trust in the incarnation. In this sense, what Christians trust, that is, have faith in, constrains what Christians can know. While the sciences can neither support nor disprove Christian claims about creation, the incarnation, or the resurrection, liberal theological claims about God's creative action in the world, past, present, and future, do not contradict scientific conclusions about physical reality, particularly when these conclusions are not read through the lenses of a reductionist philosophical materialism. Likewise, scientific conclusions about physical processes neither contradict nor support Buddhist teachings and practices.

Whatever the object of faith, knowledge is what sometimes happens when experience is interrogated through a theoretical interpretative framework that we trust. Faith seeking understanding is foundational to scientific theoretical construction and hypotheses, the multiple theoretical interpretations of Buddhism's worldview, and the theological theories of Christian tradition. Theory guided by faith applied to experience yields knowledge that is always capable of revision as new data or experience either force a theoretical framework to be revised with auxiliary hypotheses or the "hard core" of the theory is given up and replaced by a new core theory.[6] This process is called "critical realism" by Ian Barbour and roughly describes the epistemological assumptions of most working scientists. It also describes the point of view of many Buddhists and Christian theologians engaged dialogically with the sciences.

What scientists, Buddhists, and Christians have in common is faith in the enormous intelligibility and rationality that seems invariant from observer to observer and intersubjectively verifiable no matter what one's reference frame. This intelligibility and rationality is discovered and filtered through theoretical reference frames that variously and approximately grasp the

[6] See Nancey Murphy's (1990, chapter 3) use of Imre Lakatos' theory of scientific methodology in theological reflection.

presumed reality of a universe that is independent of our perceptions or knowledge of it, a universe that forces its objective order on us, submitting itself to tests and theories, sometimes agreeing with and sometimes refuting our theories, even at the cost of overthrowing some of our most cherished intuitions and subjective prejudices. All levels of the universe, from the very smallest to the very large, to the universe as such, comprise an intelligible, mathematically describable system independent of, and often doing violence to, our perceptions and conceptions of it. This is true however much it is also true that we have no access to the physical processes of the universe except through wearing the spectacles of our subjectively fashioned scientific and religious theories.

5 *Conclusions in Process*

Scientific, Buddhist, and Christian boundary constraints constitute the foundation for conceptual dialogue between the natural sciences, Buddhism, and Christianity. Science, Buddhism, and Christianity cannot claim absolute knowledge even in their own areas of inquiry, which is not to say that science, Buddhism, or Christianity do not reveal important truths about the structures of existence. If the limits of knowledge are set by boundary questions, it seems likely that a three-way dialogue between science, Buddhism, and Christianity would creatively transform science, Buddhism, and Christianity – even though it is not likely that scientific, Christian, and Buddhist boundary questions would disappear. The purpose of such a "trilogue" is the "mutual creative transformation" of the sciences and Buddhist and Christian traditions.[7]

As a means of illustration I shall draw upon examples from quantum physics, although other disciplines of the natural sciences also provide good resources for metaphors that can creatively transform Buddhist and Christian thought and practice. This reflects my agreement with Robert John Russell (1988) that quantum physics is a reliable resource for religiously meaningful metaphors in the context of contemporary culture. So while I shall draw upon certain conclusions from quantum physics in this section in order to illustrate my point about the use of metaphor, dialogue with other disciplines in the natural sciences can also serve as a resource

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[7] "Creative transformation" is a term originated by John Cobb and names the process whereby persons enter into dialogue with traditions other than their own and learn and appropriate what they can from that tradition into their own tradition. In the process, their original traditions are transformed and enriched (Cobb: 1975, 21 ff). "Mutual creative transformation" names what happens when, for example, scientists, Buddhists, and Christians are open to and appropriate the insights of the other into their own perspectives (see Ingram: 1986; Streng: 1986).

for Buddhist and Christian creative transformation. It must also be understood that the citations of quantum theory I will employ do not exhaust the possibilities of appropriating quantum theory for Buddhist and Christian dialogue.

Although physicists and philosophers of science continue to debate the metaphysical implications, particle non-positionality, wave-particle complementarity, the measurement problem, and irreducible indeterminacy appear to run rampant at the quantum level of reality. Here, Christians might be reminded of the New Testament parable about the Kingdom of God, where divine action is at work in the universe bringing about the redemption of the world from evil and suffering, both human and naturally caused. For example, the sower of seeds on a field does not stop to direct each seed to its target. But what is guaranteed is that some seeds will fall on rocky soil or among weeds, while others will fall on good soil and there take root and grow to maturity. Quantum indeterminacy and chance suggest that the structures of the Kingdom of God are constrained by the random flow of ordinary processes, and that hidden patterns seem to correlate, if not direct, all that happens.

In a similar way the Buddha is said to have taught that since all sentient beings are governed by the Laws of Karma (cause-effect) and Samsara (change), the teachings of the Buddha are easily comprehended fully by some disciples, while others less karmically able may require several lifetimes to attain Awakening. According to a few texts, like the Sukhavativyuha or Discourse on the Happy Land (or the Pure Land), a few whose negative karmic nature can never be overcome will never attain Awakening through their own efforts even if the Dharma should be transmitted to them by an awakened monk or by the Buddha himself. Such karmically "inferior beings" require the graceful assistance of Bodhisattvas (see Kato: 1971, chapter 15). Chance and indeterminacy seem to structure the universe even for Buddhists.

Quantum physics also provides new metaphors for surprise in nature. Nature is full of unpredictability and we should always "expect the unexpected." In a physics lab, for example, a researcher prepares a sample containing trillions of "identical" atoms and simply waits. Quite suddenly atoms literally at random begin to decay, each decay event, as far as any physicist can tell, without a cause. Quantum chance is not just an accident waiting to happen, the unforeseen – but in principle, predictable – intersection of two causal joints. Quantum events behave as though they are uncaused, and their surprise is of a different kind than we experience in our daily lives. Moreover, these surprise events at the quantum level radically change the history of the system involved. Atoms decay, they do not reassemble on their own. When nuclei fuse and emit light photons, they become an entirely different kind of nucleus. Particles annihilate and pairs

produce. Particles just don't change their properties, they are transformed; the old particle perishes, a new particle is born, and the event of transformation is a surprise. Thus quantum physics demonstrates that what Alfred North Whitehead called "perpetual perishing" is a reality from which surprising novelty arises at the foundational physical structures of nature. Deterministic causal explanations of this fact fall short of the reality being described because the scientific evidence suggests that the universe is radically changed and transformed continuously at each quantum event at every moment of space-time.

From a Christian theological perspective, this scientific fact suggests further metaphors for conceiving the Kingdom of God. John Dominic Crossan writes that Jesus' parables are structured around three themes: advent, reversal, and action (1973, 33 ff; cf. Russell: 1988, 356). The Kingdom appears all of a sudden, like an advent, from "nowhere," when least expected, opening up new possibilities previously unforeseen. Human response to this advent requires a reversal of the past and acting in a radically new way. Or as Robert John Russell explains:

> ... the unpredictability of a quantum event is analogous to the surprise of advent and that the transformation of matter seems like the transformation of the person as we reverse our life's journey and act anew in the Spirit of God. Quantum chance seems to capture the non-cognitive aspect of advent as well, the feeling of joy, fear and astonishment we experience when the *totally* unexpected truly occurs. (1988, 356; emphasis in original)

From a Buddhist perspective, this aspect of quantum physics seems to offer powerful consonance to the Buddhist doctrine of impermanence. According to Buddhist teaching, all things and events arise out of a web of interdependent causal factors, none of which is permanent so that the things and events that arise from these factors are also impermanent and always new. According to some strands of Mahayana philosophy, the foundation of this co-arising causal network is the Emptiness (*Sunyata*) of substantial, independently existing permanent self-identity through time. Or in the words of the Heart Sutra, "form is emptiness, emptiness is form."[8] Emptiness, or better Emptying, is the source of all things and events at every moment of space-time, to translate this into the language of physics. Things and events appear from nowhere and return to nowhere in ways that cannot be predicted or determined from present realities, although present realities are part of the causal co-originating nexus from which all things and events continuously arise and disappear, in unexpected surprising forms.

Of course, God is not reckoned as a causal factor in Buddhist philosophy. Nevertheless quantum physics seems to support a central conclusion

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[8] See Lopez: 1988 for a detailed analysis of this Buddhist text.

of Mahayana Buddhist teaching: Nirvana *is* Samsara (Awakening *is* the phenomenal world of change and becoming) since all things originate in Emptying and return to Emptying, like lotus flowers floating on a pond whose roots are in non-differentiated mud, to which the flower eventually returns. No two lotus flowers, like no two things or events, are identical or permanent, yet Emptying (like mud in a pond) takes all things and events into itself while simultaneously generating new patterns of things and events in a process without beginning or end. Realizing Emptying through the process of meditation, one attains the wisdom of Awakening that is Nirvana.

But the conversation between science and religion should not be understood to be a one way monologue. If the sciences did not have much to gain from dialogue with religion, no religious dialogue with the natural sciences would be possible. A dialogue is a two-way conversation, where participants and experts in different disciplines and religious traditions have space to engage one another for their mutual creative transformation. Mikael Stenmark (2004, 216) argues that there are four ways in which religious worldviews could and should make substantial contributions to the development of the natural sciences: (1) shaping the "problem-stating phase" of science, (2) shaping the "developmental phase" of science, (3) shaping the "justification phase" of science, and (4) shaping the "application phase" of science. For the purpose of illustration, I will focus on the problem-stating phase.

In common with scholars in other disciplines, scientists must first decide what is worth studying. The issues here are how scientists want to spend their time, energy, and their own or other people's economic resources on their various research projects. Imre Lakatos (1978, 258) writes that the sciences ought to be autonomous in the sense that the direction of research should proceed undisturbed and not be determined by any ideological or religious interests. He argued that the wider society beyond the scientific community should never be allowed to determine the choice of scientific problems and research areas. Lakatos' concern was that the integrity of science is always threatened by political interests and often by religious interests.

This seems to be a matter of obvious fact and one with which religious persons should concur. People and groups in power – governments, corporations, religious institutions – often decide the kind of research agendas scientists should pursue and which agendas should be ignored. A contemporary American example of this is the denial of federal funding for stem cell research by the Republican majority in the US Congress and President George W. Bush's administration motivated by the desire to gain political advantage with conservative evangelical and fundamentalist Christian organizations. In cases like this, scientists often have to make the difficult choice between doing their research under these conditions or not doing it at all. Science has indeed become heavily politicized and often religiously and ideologically partisan. Yet the issue is not only "big science." There are

certain areas that rich but not poor people, white but not people of color, men but not women, Christians but not non-Christians, liberals but not conservatives are interested in and which will sometimes determine what scientists decide to work on or choose not to investigate. For instance, Richard Dawkins (1986, 6) has stated that his choice of research interests in biology derives from his wish to be an "intellectually fulfilled atheist," which he thinks Darwin made possible, and from his intention to employ his research to defend atheism against all forms of theism.

Still, it is one thing for working scientists who are committed to, say, Buddhism, Christianity, Islam, or atheistic naturalism to be influenced by their worldview commitments in the selection of research questions and agendas. But it is quite another thing when religious people, politicians, or non-scientifically trained people in general are allowed to ideologically determine the agenda for scientific research. So the question is, should worldview influence on science be illuminated from the practice of science? The answer is that this is not possible. Scientific development may even at times benefit from such influence because some topics, some research programs, some things that require explanation might not be noticed by working scientists because of the particular worldview uncritically influencing their work. Therefore, it seems quite reasonable to affirm religious and/or philosophical motives to guide the kind of research scientists pursue, particularly when scientists themselves set their research agendas. The real question is, what kinds of religious assumptions, worldviews, or ideologies are influencing scientific research?

Here Buddhist-Christian conceptual dialogue with the natural sciences might aid in clarifying uncritically recognized religious, philosophical, or ideological assumptions at work in specific scientific agendas, which might foster more critical self-awareness of ideological interpretations of science that cannot be coherently supported by scientific methods or the objects of scientific research. More specifically, the reductionisms of scientific materialism might not so easily be assumed by many working scientists if they were more critically aware of reductionist presuppositions that explain by explaining away whole areas of experience – music, beauty, ethical sensitivity, longings for justice, or experiences of love, self-consciousness, and religion – as the motions of physical events. Buddhist-Christian conceptual dialogue would serve the sciences well as a reminder that scientific methods and conclusions are only relevant to a small area of physical reality. Important as these areas are, they do not constitute the totality of the structure of existence.

At the same time, however, neither Buddhist nor Christian doctrines, teachings, or practices have any authority in themselves for setting research agendas or deciding scientific questions. Furthermore, not all forms of Buddhism or Christianity are able to dialogically engage the sciences be-

cause they are ideologically anti-science. Examples abound: forms of popular Buddhism that stress karmic causes of physical and mental illness and the need for changing the cause-effect relations governing one's personal life in order to be cured of these illnesses are not conducive to dialogue with the sciences; Christian forms of fundamentalism, the intelligent design movement, or apocalyptic forms of Christian theology are not conducive to dialogue with the natural sciences, let alone dialogue with non-Christian religious traditions.

But "mainline" forms of Buddhism and Christianity are quite capable of making meaningful contributions to the practice of science through dialogue. For instance, Buddhist tradition affirms that all things and events at every moment of space-time are interdependently related, so that no thing or event is ever separated from any other thing or event. One conclusion Buddhists draw from this doctrine is that because we are so interdependently linked, the suffering of any sentient being is the suffering of all sentient beings. Consequently, Buddhists can reasonably ask scientists to refrain from conducting any kind of research that could be harmful to human and non-human life. Similarly, Buddhist interest in ecology, also motivated by universal compassion, might inspire more scientific research into the biological structures that support Buddhist views on the environment (see Sponberg: 1997).

The Christian doctrine of the incarnation of the Logos in the historical Jesus as the Christ, particularly as read through the filter of the Prologue to the Gospel of John, can also be read as a ringing declaration of the interdependence of all things and events originating in the creative action of God, both in the origins of the universe and in God's continuing creative activity in the present. Christians inspired by this interpretation of the incarnation and the doctrine of creation might also be inspired to ask scientists to refrain from research that is harmful to life. This in turn can promote scientific research as a means to attaining economic, social, and gender justice for human beings, ecological justice for both human beings and other sentient beings, along with the creation of technology that decreases the violence persons impose on one other and on the environment. Another important example is Christian encouragement of stem cell research, of which there are numerous examples not often noted in American news media.[9]

All theoretical interpretations of experience are limited and partial, which means that none gives a complete account of reality, "the way things really are." The universe seems pluralistic in structure, from the smallest dimension of quantum events, to the very large structures in the universe, to the universe as a whole. Different aspects of the universe may be better repre-

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[9] For one of the more convincing theological arguments supporting stem cell research, see Peters: 2003, chapter 9.

sented by different theoretical frameworks. If one believes in God, God's relation to impersonal objects like stars and planets differs from God's relations to persons and sentient beings. If one is a Buddhist, the non-personal dimensions of existence can seem to support Buddhist notions of Awakening. The point is that the pursuit of coherence must not ignore the differences between scientific, Buddhist, or Christian accounts of reality. Engaging in a scientific, Buddhist, and Christian trilogue will involve the use of a diversity of theoretical constructions in order to prevent the fundamentalism that occurs when we take any one theoretical construction too literally. Perhaps a more inclusive theoretical framework, yet to be discovered, may come to light because of this trilogue that might unify scientific, Buddhist, and Christian knowledge and practice.

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Chapter 7
Mystery and God: Living within the Boundaries of Human Knowledge

Gordon D. Kaufman

1

The topic with which we are dealing in this book is "The Boundaries of Knowledge in Buddhism, Christianity, and Science." We have been asked to consider three questions with respect to these diverse perspectives. How do they each explore the boundaries between the known and the unknown? What do they define as unknowable? How do they participate in the basic human quest to understand reality? In this chapter I sketch a Christian understanding of these boundaries; there is also some discussion of the sciences and a few references to Buddhism.

As a Christian theologian, I am very interested in the impact of the modern sciences on Christian faith and thinking, as well as in the fact that these sciences have deep roots in the Christian world-pictures that have been dominant in Western culture. It is hardly news that both the sciences and Christianity have greatly influenced our modern Western ways of understanding human existence and its problems. I want to suggest, however, that the basic understandings in the West of "the boundaries between the known and the unknown" have not been drawn largely from either of these perspectives; they are, rather, rooted in our deep human sense of the distinction between *mystery* and *knowing*. The ongoing fertile marriage of these two perspectives (Christianity and the sciences) over many generations in the West has also, of course, had its own significant effects.

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I shall briefly sketch, first, my own way of thinking about this whole problem of "the boundaries between the known and the unknown." At its deepest level – in my view – life confronts us humans as *mystery*, in many respects. Much about human nature and experience, and the meaning and context of human life, is incomprehensible – possibly unknowable. Consider, for example, the enigma of the origin of our universe in an almost un-

imaginable "Big Bang," and then billions of years later the emergence of life amongst the ashes of that mighty explosion, and still later the appearance of our own human reality with its remarkable consciousness and thought, purposive action and creativity. Consider the magnificence of a glorious sunset, of the Grand Canyon, of the nightly star-filled heavens above: the world into which we have been born – and we ourselves – are profound mysteries, evoking spontaneous awe in many of us. Despite the claims of some of our religions, we humans have no settled answers to questions about these mysteries: about what we humans really are, and about the ultimate reality with which we have to do; about which of the problems of life are the most important; about how we should live out our lives. We seek to orient and order ourselves, of course, in terms of what we (quite properly) think of as *knowledge* of the environing world within which we live, and of our place within that world. But the wider and deeper context of our lives remains inscrutable mystery – indeed, many mysteries.

Hence, instead of beginning my reflections here with our human knowledges, I begin with some consideration of our ultimate *unknowing*, not our knowing – some consideration of the profound mysteries with which we humans must come to terms. But first let me say something about this word "mystery."[1] A mystery (as I am using the word here) is something that we find we cannot think clearly about, cannot get our minds around, cannot manage to grasp. When we use this word in this way, we are indicating that what we are dealing with seems to be beyond what our minds can handle. When we say of something that "it is a mystery," this does not in fact tell us anything specific about that of which we are speaking, or which we are seeking to understand. Rather, it calls attention to something about ourselves. The word "mystery" functions as a linguistic device by means of which we remind ourselves that at this point we do not know just what to say, and we are, therefore, using our language in an unusual, limited, and potentially misleading way. This does not mean, of course, that we may now cease employing our faculties in a thoroughly *critical* way; on the contrary, it alerts us to the necessity at this point to employ our critical capacities to their utmost. So I want to begin my reflections on the boundaries between the known and the unknown by reminding us of the mystery in all our lives, all our experience, all our knowing.[2]

Some of these dimensions of mystery gradually fade as we grow older and gain new experience and knowledge. This may lead us to suppose that eventually the sense of mystery may disappear completely for us humans.

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[1] The rest of this paragraph is a paraphrase of several sentences in Kaufman: 1993, 60f.

[2] Though there are differences in nuance between "mystery," "not knowing," "unknown," and "unknowable," for my purposes here these words will be used more or less interchangeably, since they all articulate a condition opposite to "knowing" or "knowledge."

It always turns out, however, that our confrontation with the boundaries between our knowing and our unknowing have simply moved back a little, have moved a little deeper. And after awhile we realize that all of our knowing takes place, actually, within the context of the unknown, of mystery. And we come to understand, as Karl Rahner has beautifully put it, that

> What is made intelligible is grounded ultimately in the one thing that is self-evident, in mystery … . In the ultimate depths of [our] being [we know] nothing more surely than that [our] knowledge, that is, what is called knowledge in everyday parlance, is only a small island in a vast sea that has not been traveled. It is a floating island, and it might be more familiar to us than the sea, but ultimately it is borne by the sea … . Which [do we] love more, the small island of [our] so-called knowledge or the sea of infinite mystery? (1978, 22; trans. slightly altered).

In due course we come to realize that the sense of mystery – of our unknowing – is not something that is going to go away as we acquire increasing knowledge. Our unknowing remains as the ultimate context of all our knowing.

Is this mystery-dimension of our self-understanding something we learned from the sciences or Christianity? That suggestion would be quite misleading: our awareness of mystery is a sensibility that comes to us with and through *all* the knowledges that we possess. It is a basic feature of our self-consciousness as mature reflective persons, and it is neither specifically scientific nor Christian (nor Buddhist, for that matter), but rather an awareness underlying and qualifying all our human knowing. The line between knowing and not-knowing (if it is appropriate at all to speak of this as a kind of boundary line) is drawn in the depths of our consciousness, our humanness; it is not derived from this or that perspective. It is a dimension of consciousness without which there could be no knowledge at all, for all our knowledges *presuppose* a distinction between knowing and not-knowing. Without this distinction no "basic human quest to understand reality" (the third issue in our assignment here) could ever have come into being.

With these reflections in mind, let us return to the specific question about our *un*knowing, the question of our sense of mystery. Throughout most of human history what we today call "the religions" have provided us humans with interpretations of the profound mysteries within which our lives transpire – interpretations that were sufficiently meaningful and intelligible to enable women and men to come to some significant understanding of themselves in relation to the enigmatic context in which their lives proceeded, and which were sufficiently appealing to motivate them to attempt to live meaningfully and responsibly within that context. The human imagination has produced many such visions of the world within which we live, and of the ultimate reality (if there is any such thing) with which we must come to terms; and many quite diverse understandings of the significance of human life within these contexts. Some of these became the basis

for religious traditions of sufficient meaning and interpretive power to have oriented the lives of women and men for generations; but none, I contend (despite some claims to the contrary), have succeeded in overcoming or setting aside the ultimate mystery of things.

In recent centuries our scientific knowledge of the world and of the life-processes that have brought us humans into being has transformed or displaced much traditional religious thinking, at least in the West. But however convincing these scientific pictures of human-life-in-the-world may be to many of us today, they also – like our long-lived religious traditions – have not succeeded in dissolving away the ultimate mysteries of the world and life. Indeed, they have magnified enormously some dimensions of the unknowing with which we today must come to terms.

For example, in our modern sciences the universe is thought to be very large – 14 billion light-years across – and consisting, perhaps, of as many as 200 billion galaxies, each of which, on average, likely contains 100 billion stars. (Take a minute to think about that: can you really make out the meaning of these numbers? – 100 billion times 200 billion? – or is that abstract number itself a mystery that really is, in significant respects, beyond our human grasping?) It is claimed that our universe began in an enormous inexplicable event (a mystery!), usually called the Big Bang, an event believed to have occurred approximately 14 billion years ago. According to Stephen Hawking (to take just one example) in his book, *A Brief History of Time* (Hawking: [2]1998), we humans have no way of knowing whether there was anything before the Big Bang or, if there was something, what it could have been. That is, we humans can never know, or even plausibly imagine, how the most momentous event of which we are aware – the beginnings of the universe, of all that is – came about. Nor can we know anything about what might be beyond our universe. In this book Hawking states why there are these limits: "the universe has a beginning and an end at *singularities* that form a *boundary* to space-time ... *at which the laws of science break down.*" ([2]1998, 144; emphasis added)[3] So, although today's sciences are not the ultimate source of the questions about the boundaries of knowledge that we are pursuing here, these sciences themselves confront us directly with a version of those questions: Why is the universe so massive and diverse, and why did it come into being when it did? Why – and how – can such a multitude of realities have come into existence? Why have life – and eventually consciousness – come into being? Indeed, Why is there something, not nothing?, as Leibniz long ago asked. In some of its cosmological and evolutionary ideas modern science confronts us directly

[3] Not everyone agrees with Hawking on this point; for a different view see Rees: 1997. A good many scientists are hopeful that "string theory" will provide us with a better way to think of this problem, but that is far from clearly proved.

with some sharp boundary-lines between what can be known and what can never be known – the ultimate *mystery* within which we humans, and all the world, are situated.

I mentioned a moment ago that one of the issues, with which the various religions have usually attempted to deal, has been these profound mysteries within which human life and consciousness find themselves. One religious way of dealing with these matters has been to frankly acknowledge these mysteries, and then to propose ways to help humans learn how to live within this mysterious world: when confronted by the ultimate mystery of things we should, for example, seek to live by faith, trust, courage, and so on; in this way life can go on. There is another quite different approach to this problem of our not-knowing, however, an approach advocated by some Christians: it involves holding that the Christian gospel provides humans with a profound *knowledge*, a knowledge that overcomes the ultimacy of the mystery of life by dissolving it away.

Christianity has wavered between these two quite different alternatives, sometimes leaning in one direction, sometimes in the other; and sometimes trying to have it both ways. (It is my impression that Buddhism also has wavered somewhat between these two alternatives.)[4] This double, perhaps incoherent, stance in Christianity on the question of the ultimacy of mystery, the ultimacy of our not-knowing, is directly derivative from a deep central conviction in traditional Christian faith: that God – the Creator of all that is – has definitively revealed Godself to humanity in and through Jesus Christ, and thereby made known to humans that God is an infinitely loving, forgiving, generous reality. In this understanding of Christian faith, questions about the existence of God, the nature of God, and the meaning of human life under God can all be dealt with fairly straightforwardly; and thus some of the profound mystery of life dissolves away.

In Christianity, thus, there are two quite distinct understandings of the profundity of mystery. On the one hand – for some who think of themselves as living in *response* to this divine revelation – the nature of God as a loving reality is thought to be definitively known, because God has revealed it in and through the ministry and message, the death and resurrection, of Jesus; and God (being the very Creator of the heavens and the earth, and being all-knowing and completely trustworthy) is the ultimate, unquestionable authority respecting all that ever has been or will be, the ultimate source of all truth and knowledge. Since it is precisely this God – creator and ongoing ruler of the universe – who has revealed all these matters in and through God's only son, God-*incarnate*, Jesus Christ, there can be no questioning of their reality and truth. Though much about God remains unknown, and

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[4] A very fine article about the enormously complex dialectics of knowing/not-knowing in Christianity and Buddhism will be found in Thometz: 2006.

the ways in which God orders and rules the world may often be incomprehensible – profound mystery – those who respond with this kind of faith in what is believed to be God's self-revelation often feel they have an absolutely secure foundation for their lives. And thus questions about the ultimate *mystery* of life tend to dissolve away, though of course much remains that is unknown and completely unintelligible to us humans. In this view a specific *knowledge* – divinely revealed knowledge – overpowers all questions about the ultimate mystery of life's meaning and intelligibility.

On the other hand, however, Christians can also argue that all of these points are simply *human claims* about God and God's revelation, human *beliefs*; and all human claims and beliefs are fallible, and may well be mistaken. So all – without any exceptions whatsoever – of the traditional Christian *claims* about God, and about God's revelation in Christ, may be called into question and should be regularly re-examined carefully. According to this view, there is no way for these claims ever to be fully verified since all such examinations would themselves necessarily be carried out by fallible humans. Here, thus, the ultimacy of *mystery* in our human existence and consciousness overpowers the claims about the weightiness and the reliability of the talk about God and God's revelation. This sort of argument was first developed – in the early centuries of Christian history – in the so-called "negative theology" and it has continued all the way down to the present.[5]

For this latter point of view (with which I concur) Christian faith does not dissolve away the ultimate mystery of things but instead shows us a way to live fruitfully in face of that mystery. Christianity does not offer its believers an absolutely certain kind of *knowledge* about God, as is claimed in the first interpretation that I sketched – or, for that matter, any certainty of knowledge about other metaphysical, scientific, or theological issues – but instead it acknowledges that we humans must live our lives within an overall context of mystery, of unknowing. Precisely this is what *faith* is all about (in this way of thinking). Faith is not about living with a certainty that everything is going to be okay in the end because we know that our heavenly father is taking loving care of us. (Think of the recent massive hurricanes, earthquakes, and the tsunami when you are meditating on God's "loving care" of all humans!) True faith in God (in this second understanding) is, rather, acknowledging and accepting the ultimate mystery of all these things, and precisely in face of that mystery going out like Abraham (as Hebrews 11:8 puts it) not really knowing where we are going, but nevertheless moving forward creatively and with confidence, *trusting* in the supreme mystery of life, *God*. As I put it in my book *In Face of Mystery*:

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[5] For a brief sketch of the different phases of the history of negative theology, see Kaufman: 2004, 22–26.

> Precisely because of the mystery, we must engage in relentless theological criticism of our faith and its symbols; precisely because of the mystery, we must give a prominent place in our vision of reality to forthright acknowledgement of our ultimate unknowing; precisely because of the mystery, we must undertake disciplined but imaginative construction of a vision of the world to which we can give ourselves, in faith, with confidence. (1993, 63)

We have here two interpretations of Christian faith that are directly contradictory to each other with respect to questions about the limits of human knowledge – questions about the ultimacy of mystery, of our not-knowing. In Christianity, thus, the proper roles of knowledge, mystery, and faith in the ordering of our lives may be construed in two quite different ways. Christianity does not, in my opinion, have a single approach to the issue of the limits of knowledge: in Christianity there are at least these two strikingly different understandings of these limits, and thus two different understandings of the boundaries between the known and the unknown.

3

We can now turn to the third question we have been asked to address: How does the perspective of Christianity – given these boundaries of our human knowledges – participate in the basic human quest to understand reality? This question will be addressed through an exposition of my view of what it means today to live with faith in God, despite the fact that God is understood to be an ultimately unknowable mystery.[6]

In Western religious traditions God has often been designated as the ultimate mystery of things. (This is as true for Judaism as for Christianity.) However, the symbol "God" has more definiteness and specificity than the concept of mystery. "God" is the name ordinarily used to designate that reality (whatever it might be) that grounds and undergirds all that exists, including us humans; that reality which provides us humans with such fulfillment or salvation as we may find; that reality toward which we must turn, therefore, if we would flourish. The symbol "God" thus leads men and women to attend to and reflect on the ultimate mystery of things in its aspect as that which creates, sustains, and enhances human (as well as other modes of) existence. What can we say today about this underlying reality, so important to human being and well-being? There are, of course, many who do not accept the validity and appropriateness of this symbol at all, and who refuse, therefore, to think about it in this way. And according to contemporary understandings, both scientific and historical, what actually

[6] Much of what follows in this chapter has been drawn – with editing and updating – from an earlier article of mine (Kaufman: 1992). See also my recent article (Kaufman: 2007b).

creates and sustains human life are the physical, biological, and historical processes that provide its context. In my opinion it is in connection with these matters, therefore, that a theological perspective for today should develop its conception of what it calls "God." The name "God" can take up, hold together, and illuminate these vast and complex processes in a distinct and powerful symbol that accents their meaning for human existence. As we seek to order our lives and activities in terms of our vision of human existence among the realities in a vast ecosystem, the symbol "God" (I shall argue) can help focus our consciousness, devotion, and work, through providing overall orientation and direction for our concrete everyday decisions and actions of life.

The symbol "God" has always functioned in this way, as the focus for a picture of the world as a whole (see Kaufman: 1993, chapters 21–23). For example, in the biblical world-picture in which this symbol was given its most influential form, God was usually not portrayed as a being whom humans encountered directly in its solitary splendor. On the contrary, precisely because of the emphasis on God's radical independence and self-subsistence, a central biblical theme was that no one ever has direct or immediate contact with or experience of God. Even Moses, through whom God is said to have made Godself known decisively, was not allowed to see God's "face," we are told, but only God's "back" (Exod 33:23). Indeed, God told Moses (according to Exod 33:20) that "you cannot see my face; for no one shall see me and live." This inaccessibility of God is a theme that is frequently repeated. For example, Job, in the midst of his tribulations, seeks God for an explanation, but God is nowhere to be found: "Look, he passes by me, and I do not see him; he moves on but I do not perceive him … . If I go forward, he is not there; or backward, I cannot perceive him; on the left he hides, and I cannot behold him; I turn to the right, but I cannot see him" (Job 9:11; 23:8–9). In the Fourth Gospel (John 1:18) and again in 1 John (4:12), we are told that "No one has ever seen God." For the biblical traditions in the main, God is simply not the sort of reality that is available to direct human observation or experience.[7] For the most part, subsequent theological reflection has taken this same line: it has usually held that all knowledge of God is analogical or

[7] The Bible is not entirely consistent in this emphasis; some "theophanies," for example, are reported in the Old Testament. Enoch, we are told, "walked with God" (Gen 5:22, 24); God "appeared" to Abraham (Gen 17:1; 18:1) and spoke to him; Jacob wrestled with "a man" all night long, and then later said he had "seen God face to face" (Gen 32:24). And in the New Testament, after denying that anyone has ever seen God, it is stated that "It is God the only Son, who is close to the Father's heart, who has made him known" (John 1:18). It is not evident, however, that much should be made theologically about these ancient OT stories, and this NT affirmation is made in direct connection with the explicit claim that "No one has ever seen God." (Note: All biblical passages in this chapter are taken from the New Revised Standard Version.)

symbolic; that is, it is never unmediated or direct but is based on likenesses drawn from ordinary objects of experience.

How, then, did God-talk develop? It emerged in connection with a specific *world-picture* – a picture constructed by the human imagination over many generations, a picture in which the dominant active power in the universe came to be seen as a *creator/lord/father* ruling from on high.[8] Believers gradually found that the image of this creator/lord/father – *God* – provided a focus that could bind everything in their world together into a meaningful whole, a whole within which all of life's vicissitudes had a proper place and significance. It was an image, thus, to which women and men could give themselves without reservation. In thinking about this, it is important that we remind ourselves of the fact that all of what we today call "knowledge" is a product of the human imagination, interpreting and expanding upon experiential and other data; and that all the "realities" of which we are aware always shade off into ultimate mystery, ultimate unknowing (as we have noted). The meaning of the idea of God, thus, was not derived principally from direct encounters that some women and men from time to time had with a superhuman being, but instead from its employment as the symbolic center and focus of an overall world-picture subscribed to by believers.

This monotheistic world-picture was *dualistic*: using materials drawn from human experience within the believers' world, it also spoke of an *other* world (as Rudolf Bultmann put it).[9] To humans, all of whom live on this side of the great divide in reality, this picture presented important matters about the *other* side. This idea of an "other world" or "other side" – the idea that the Most Important Reality is outside or beyond this world in which we live and have our experience – leads men and women to imagine and speak of things which, though totally inaccessible to us, we nevertheless suppose we know a good bit about. In the biblical stories we are told much about God, God's rule, and God's other activities; but of course the only basis we have for this information is the stories themselves – these myths created by the human imagination thousands of years ago.

A sharp distinction is made between the Creator and all other reality (God's creation), and this pushes the dualism forward very forcefully in virtually all traditional Christian thinking. I shall argue here, however, that if we develop our conception of God in terms of the idea of *creativity* instead of "the Creator," we will be able to move away from this dualism be-

[8] The argument backing up this understanding that the symbol "God" is a product of the human imagination is worked out in detail in a number of my books (e.g. Kaufman: [3]1995; 1981; and especially 1993; 2004; 2007b).

[9] See Bultmann's famous definition of the mythology in the New Testament: "Mythology is the use of imagery to express the other world in terms of this world and the divine in terms of human life, the other side in terms of this side." (1953, 10n)

tween God and the world. In our Western religious traditions (in contrast with, for example, most Buddhist traditions) this dualistic symbolism of an *agent*-God ruling the world from on high gave rise to the idea of a powerful *teleological* movement (God's providence) underlying and ordering all this-worldly processes. In recent centuries, however, this idea has become very problematic. So, in keeping with today's sciences – which emphasize *evolutionary development* and, more recently, the ongoing *emergence* of truly novel unpredictable realities – I propose that we replace this traditional teleological picture with the conception of (a) "serendipitous creativity" manifest throughout the universe – creativity (b) that continuously brings into being novel directional but open-ended trajectories.[10]

This more open (even random) notion of creativity expressing itself in evolutionary and historical trajectories of various sorts represents accurately (though somewhat vaguely) much that has occurred as these processes have unfolded. And it can be employed to cover the enormous expansion and complexification of the physical universe, which (from the Big Bang onward) preceded the evolution of life here on Earth and was the condition of its possibility. This creativity – a profound *mystery* to us humans – has often produced much more than might seem possible (given previously prevailing circumstances), even moving eventually, along one of its lines, to the creation of history and humanity. I suggest that it is appropriate today to speak of this whole vast cosmic process as manifesting (in various degrees) serendipitous creativity.

Even though this picture may be somewhat plausible, no coercive proof, of course, can be provided that the universe involves creative activity of this sort; to take up such a position, therefore, a step of faith is necessitated.[11] Since this notion of creativity can (as I shall show) be quite useful in helping to orient human existence today, I propose that – as a tentative preliminary step of faith (and toward faith) in God-as-creativity – we agree (for now) to think of this overarching context of human life, the universe, to have been produced by this serendipitously creative activity.[12] And this *creativity* should be understood, thus, as itself the continuing context and sustaining environment that makes human existence possible, and which is the ultimate source of the richness and fullness of that existence. We men and women are the only living beings (so far as we know) who can deliberately and self-consciously set purposes for ourselves, and can deliberately and self-consciously work toward

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[10] See especially Kaufman: 2004; 2006; 2007a. When speaking of creativity, I frequently employ the adjective "serendipitous" to emphasize both the unexpectedness of most creativity as well as its production of novelty: something *new* has come into being. This ongoing creativity in the universe – and in human affairs – is usually quite surprising to us humans, and sometimes also very beneficial: it is a profound mystery.

[11] For discussion of the concept of "steps of faith" see Kaufman: 1993, chapter 17.

[12] For a full discussion of this matter, see Kaufman: 1993, Part 3.

their realization. That is to say: in and through and with us humans, activity that is straightforwardly intentional or purposive – explicit teleological activity – has become operational within the world, has been created. What does this imply about the evolutionary process that has brought us forth? And ultimately, what does this imply about the world?

4

To begin to answer these questions, let us first take note of some important characteristics of the evolutionary process. First, observe that the movement in and through time, as we trace the long history of the universe and particularly the evolution of life on Earth (as these matters are now understood), seems to be irreversible, and in this respect unidirectional (see Kaufman: 1993, chapters 19–20). That is, although many whirls and eddies and detours appear in cosmic and evolutionary development, and many cycles of night and day, of seasonal change, and of birth, growth, and decay are to be found here on Earth, there seems to be an essentially continuous movement into new forms, into unprecedented developments – not simply patterns which forever repeat themselves. Moreover, these new developments, to the extent that they involve the appearance of new evolutionary lines (e.g. new species), have specific potentialities for developing further in some directions but not in others. In the evolution of life such tendencies, as biologist Ernst Mayr (1988, 435) says, "are the necessary consequence of the unity of the genotype which greatly constrains evolutionary potential." To the extent that a new evolutionary tendency enables a species to adapt to its environment more successfully than its predecessors, a certain momentum of development in a particular direction is set up; and increasingly effective adaptation may appear over successive generations, sometimes leading to the emergence of new species.

From today's human standpoint, well aware as we are that increasingly complex species have emerged as evolutionary lines developed further, this all may seem to have involved a kind of trajectory toward such complexity. This appears, however, only because our human viewpoint is retrospective; but there is no reason (from a biological perspective) to suppose that these processes are actually directed, somehow, toward this or that specific goal, or toward any goal for that matter. The processes of natural selection themselves, it appears, bring about open-ended movements along various lines down which life evolves; and time, in the evolutionary process, thus seems to take on an increasingly linear and directional character.[13] This be-

[13] J. Bronowski (1970, 34) states flatly that "It is evolution, physical and biological, that gives time its direction." "In a history of three thousand million years, evolution has not run

comes evident also from another side: when living forms that have emerged become extinct, as many if not all eventually do, they do not reappear again at some later point but are forever left behind. Cosmic time, then, to the extent that it is to be understood in light of evolutionary processes continually branching out and developing in many different directions, is irreversible, creative of the new, and in that sense linear and unidirectional.

Second, it is not entirely incorrect to suppose that some momentums created through natural selection have moved toward what (from our anthropic standpoint) may be regarded as "higher" forms; and along one line such a movement has given rise to a significantly new order of reality – human history and human beings. It is not that the evolution of life has been a sort of straight-line development up from the primeval slime to humanity: evolutionary developments have gone in many different directions. Most of these lines have died out, although some have achieved a basic equilibrium with their environment and have thus become stabilized. Moreover, it is not evident that the human line is as biologically viable as are, for example, some insects. So, from a strictly biological standpoint (which emphasizes survival, perpetuation of the species) there is little reason to think that human life is the most successful product of the evolutionary process.

In this chapter, however, I am not taking a strictly biological point of view. I am concerned, rather, with our profoundly *human* need to orient ourselves in life and in the world in which we find ourselves. Our human sociocultural developments have gradually emerged into what we have come to call "history." Human history – with its high development of cultures and modes of social organization, within which have appeared beings with self-consciousness, freedom, responsible agency, and deliberate creativity: beings with "historicity" – cannot be adequately understood simply in terms of such notions as metabolism, nutrition, reproduction, and the like. We humans are *biohistorical* beings:[14] although we are in important respects but one among many forms of living beings, in ways quite significant to us humans we have moved beyond the purely biological into a distinctly new order of reality.

It is not the case, thus, that these beings with "historicity" – *human* beings – appear simply as the last stage of a long biological process (see Kaufman: 2006, chapter 3; 1993, chapters 8–9). It was only after many millennia of a gradually developing *historical* process (interwoven with fur-

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backward ... the building up of stable configurations ... [has] a direction ... which cannot be reversed ... . And it is not a forward direction in the sense of a thrust toward the future, a headed arrow. What evolution does is to give the arrow of time a barb which stops it from running backward; and once it has this barb, the chance play of errors will take it forward of itself." (28, 31 f, 34)

[14] For a full discussion of humans as "biohistorical," see Kaufman: 1993, Part 2; 2006, chapter 3.

ther biological evolution) that human existence as we presently think of it came on the scene. The beings that we humans now are, thus, are quite as much a product of long and complex historical and cultural developments (going in significantly different directions in different parts of the world) as of evolutionary biological processes. As we look back now over this slowly cumulating biohistorical development, the outlines of an open-ended cosmic "trajectory" – gradually moving into the creation of beings with significant historical powers, beings with *historicity* – begins to come into view (see Kaufman: 1993, chapter 20). It is important to understand that neither the "creative advances" nor the "directionality" visible in this trajectory need be attributed to some *causative* power pushing (or pulling) evolution and history forward toward this particular goal: as we have noted, the creativity in the universe does not appear to be teleological. Nevertheless, it would be strange for us humans not to affirm the overall movement in this trajectory – apart from which we humans would not exist – as *good*, to be highly valued (at least by us). In light of these considerations, our massive failure to care properly for our environment on planet Earth is, of course, deplorable.

Though chance genetic variations and other physical and biological conditions of extremely low probability doubtless have played important roles in this long march, we need not view this development – visible in our line of the evolutionary process – as due *entirely* to chance (as some claim). The trajectory eventuating in the creation of human historical existence should be seen, rather, as a significant expression of the *serendipitous creativity* manifest in the cosmos: the appearance of human modes of being in the world can quite properly be regarded as grounded in this mystery of creativity – that ultimate source of all that comes into existence – and thus should not be thought of as a metaphysical surd. This view clearly requires a step beyond our initial step of faith which affirmed simply the pervasive creativity in the universe. It is worth noting that this further act of faith is not as uncommon among intellectuals these days as one might expect. All speculation about and search for *intelligent* life in other parts of the universe rests on the assumption that there may be, throughout the universe, some pressure toward developments that eventuate in forms of life like those we have here been calling "biohistorical"; and we may, therefore, if we search long enough and carefully enough, uncover signs of such highly complex forms in regions far from planet Earth. We do not know, of course, where the trajectory – culminating (to date) in the historicity on our planet – will move in the future: perhaps toward the opening of ever new possibilities for human beings, as we increasingly take responsibility for our lives and our future; perhaps going beyond humanity and historicity altogether, however difficult it is to imagine what that might be; perhaps coming to an end in the total destruction of human life.

I am suggesting that, with the introduction of two basic ideas, we can develop a conceptual framework that enables us to interpret this evolutionary cosmos in a way that will assist us in finding our place in the world. These two ideas are (1) the notion of cosmic serendipitous *creativity*, which (2) expresses itself through *trajectories* of various sorts that work themselves out in longer and shorter stretches of time. According to this interpretation, the universe displays (throughout its evolutionary processes) open-ended directional movements; and the beginnings of our *human* trajectory, moreover – when viewed retrospectively from our twenty-first century standpoint – seem in some respects to be proto-teleological. With the emergence of historical modes of being, moreover, actual teleological patterns have appeared in the world, as human intentionality, consciousness, and purposive actions began to become effective. Thus, just as physical energies and vital dynamisms in individual human beings gradually become sublimated and transformed through processes of socialization and enculturation into strivings of and toward *spirit* – that is, toward ideal values such as truth and beauty, goodness and justice and love – so also cosmic trajectories, which have their origins in what seem to be mere physical movement or vibration, may (in some instances) gradually develop, through increasingly complex forms of creativity, a context within which deliberate purposive activity can emerge.

To the extent that we can regard our human existence – with its historical and purposive modes of life – to be a significant *clue* to the direction in which at least one trajectory of the creativity manifest throughout the universe has moved, we begin to discern a metaphysical grounding for the human spirit and its aspirations, projects, and prospects: the mystery of creativity. This brings us a step further toward an understanding of human existence as having a kind of meaning in the cosmic scheme of things. As we shall see below, we are beginning to sense here something similar to what humans, with their faith in God, found in the past.

So our two metaphors – "creativity" and open-ended "trajectories" – taken together, enable us to discern a distinct significance in the process that has brought our historical existence into being: it is a process which has been increasingly directional, a process in which *teleological* activities eventually become apparent. This creativity remains, however, deeply mysterious to us. The idea of serendipitous creativity taken simply by itself, on the one hand, seems much too open and random to illuminate satisfactorily the full significance of either the emergence of historical forms of order out of biological forms, or the overall development of human history. And, on the other hand, if we seek to employ a notion of *teleology* to interpret this overall development, we find ourselves suggesting a process too unswervingly and unqualifiedly goal-oriented to be plausible today (a major problem with nineteenth-century notions of progress, as well as with tra-

ditional Christian conceptions of God's providence). But taken together in the somewhat vague notion of open-ended creative trajectories (creative movements onward but without definite goals) these two ideas – *creativity* and *trajectories* – can provide us with a somewhat credible contemporary picture of our evolutionary world, and the emergence of human life within this world. These two concepts, taken together, generate a way of conceiving our world as one within which we can meaningfully inquire about how human life may be appropriately oriented.

I shall sum this up by briefly mentioning five points. First, this approach provides a frame within which we can characterize quite accurately, and can unify into an overall vision, what seems actually to have happened (so far as we know) in the course of cosmic evolution and history. Second, it gives a significant, but not dominant, place and meaning to the distinctive character of human life and history within this cosmic process. Third, this approach, therefore, provides a basis for developing general principles of interpretation in terms of which we communities (and individuals) can attempt to understand both the biological context of our lives and the historical developments through which we are living, thus orienting us in a manner that encourages our taking responsible roles with respect to these contexts and developments. Fourth, this is an approach which, because it gives significance to the humanistic and humane values appearing within the cosmic order, can provide a ground for hope (though not certainty) about the future – a hope about the direction that future creativity in our human trajectory may go: a possible movement toward a new humanity living in a new age. Finally, a hope with a cosmic grounding of this sort – even though carrying much less assurance than that provided by traditional religious expectations of the coming of God's kingdom – can help to motivate us men and women to devote our lives to bringing about this more humane and ecologically-sensitive world to which we all aspire.

This frame of orientation – this vision of reality – is not, of course, in any way forced upon us. As we have noted, it can be appropriated only by means of our own personal and communal decisions, our own acts of faith. It will provide orientation for us only as we decide to commit ourselves to it, ordering our lives and building our futures in the terms it prescribes.

5

In what way can the symbol "God" be related to this interpretation of creativity, the world, and human existence in the world? In what respects does the *theocentric* character of this symbol add to, and otherwise qualify, the conception of the world and humanity with which we have been working here? Is it really possible to connect – in a significant way – our

inherited symbol "God" with this view of the creativity in the world? In what respects (that is to say) can the symbol "God" help provide significant meaning and orientation for human life in today's world, as we have been considering it here?

As noted earlier on, for those living and thinking within a theocentric worldview, the symbol "God" *focuses* human devotion and activity in ways that orient existence toward that which is believed to bring human fulfillment, well-being.[15] God, that is to say, is regarded as that reality – and the symbol "God" is therefore taken to express the complex meaning – to which each person may give herself or himself, and on which communities may orient themselves, thus giving human life wholeness, meaning, salvation. This symbol, thus, may still be regarded as potentially a significant focus for human consciousness, devotion, and service – a focus that can provide overall orientation and guidance for human life. And for those with faith in God-as-creativity, a kind of ultimate security in life, profound consolation in moments of deep sadness, healing in situations of despair, may all still become possible. In my view, the evolutionary/historical conception of the world that I have been presenting here can be significantly concentrated and focused – and simultaneously relativized – by the symbol "God"; this symbol, thus, can continue to provide significant orientation of our human existence in the cosmic scheme of things, and can deepen our human motivation to live responsibly.[16]

It is important to note that the concept of the *universe* taken by itself, i.e. the evolutionary-historical process as a whole, cannot provide us with proper orientation in life; nor can the notion of the ultimate *mystery* of things. The universe presents us with such enormously complex patterns and such multiplicity of detail that it can scarcely be grasped by our limited minds; and "mystery" is so vague and amorphous in its meaning that it can tell us nothing specific about what we should be or do. Moreover, since both of these notions are intended (each in its own way) to be inclusive of everything, neither can provide us with clear norms or criteria for making choices: decisions in life always involve giving preference to some things over others – to some possibilities, some forms of life, some persons or

[15] A much fuller, more detailed picture of the orientation in the world which this kind of thinking provides will be found in my two recent books (Kaufman: 2004; 2006) which elaborate my interpretation of God as creativity, creativity as God. See also Kaufman: 1993, chapters 21–22.

[16] In this chapter I am not presenting a full-blown conception of God. I do not, for example, take up the critical *deconstruction* of the imagery constituting the traditional concept of God (seen as the "creator/lord/father") that is required for adequate contemporary theological reconstruction. That imagery, as we know today, has often led to serious consequences: oppression of women, promotion of religious imperialism and tyranny, encouragement of various sorts of infantilism and immaturity, and so on. A much fuller conception of God, dealing with these and other related matters, will be found in Kaufman: 1993, chapters 21–27; 2004; 2006.

loyalties or causes. Thus, neither the concept of mystery nor the concept of the world can by itself be of much direct help in guiding our day-to-day decisions or providing direction for our lives as a whole.

What we need is a symbol that can draw upon both our understanding of the world and our awareness of the ultimate mystery of things, while simultaneously holding before our minds in sharp synoptic focus what is essential today for the orientation and guidance of human life. Such a symbol must have a double focus: (1) a focus on the *specific dimensions* of the creative evolutionary/historical process to which we need to attend, as we seek to identify and address the major problems and evils with which life today confronts us – a focus, that is, which can provide us with overall orientation in today's world, thus assisting us to address appropriately the practical decisions of our day-to-day lives; and (2) a focus on the questionableness, the mystery, the problematic character of all our attempts to provide ourselves with adequate orientation in life – a focus, that is, on the danger of giving ourselves over too uncritically and too completely to *our* values, meanings, and conceptions of life and the world, all of these having been constructed by us finite humans.

The image/concept of "God" – properly *re*constructed – can provide both of these desiderata. As we have noted, this symbol more than any other in our language has represented, on the one hand, that which gives us humans our being and continues to sustain us in being, that which heals our diseases and brings us salvation from evil, that in relation to which women and men can find fulfillment – though, on the other hand, it has simultaneously focused attention on that which must ultimately be acknowledged as *mystery*, and must thus be subject to questioning and reviewing. Thus, this symbol holds together before the mind – in a complex of powerfully evocative values and meanings, criteria and norms, images and concepts – that which can both orient men and women in the world today, and motivate them to address their pressing problems, while it simultaneously alerts them to the questionableness and necessary tentativeness of all these this-worldly commitments. Today, in my view, the symbol "God" calls us to seek out and consciously attend to the *creativity* in the evolutionary and historical processes, the creativity that gives us our humanity and provides the context of human existence as we understand it – thus drawing us on to a more authentic humanness.

In ancient Israel, the image/concept of God was a symbol that provided a sharp and distinct focus for human consciousness, devotion, and activity; a focus which, through orienting humans on an image of powerful moral agency outside themselves (Yahweh [God]), drew them beyond themselves toward higher reaches of self-understanding, responsibility, historicity, and freedom. It thus provided a *focus* for human consciousness and devotion that oriented human life toward the potentialities latent in human historic-

ity. Can this symbol bring our modern picture of the world to a focus that significantly orients human life in a similar way?

Our world today, I have suggested, is a serendipitous product of the creativity that has produced a variety of open-ended trajectories, one of which has brought into being the order of history and which may be continuing on in further creativity. "God" is the proper name for this creativity – the ultimate *mystery* manifest throughout the universe and thus also manifest in our evolutionary-historical trajectory, culminating (to date) in human historicity. As construed here, the symbol "God" can perform a number of important orienting functions. (1) It gives profound meaning to human life and its tasks – summed up in such concepts as humanizing, humanness, humaneness, historicity, responsibility, and creativity, all of which are taken to be expressions of the divine creativity (i. e. of God). (2) It provides believers with identification and interpretation of what is of highest importance to *human* existence, in both the natural world and in the historical developments around us, through presenting the trajectory manifesting historicity and humanization as a product of God-as-creativity. (3) It relativizes, and thus provides critical leverage upon, every aspect of our *human pictures* of God, the world, and humanity, through emphasizing that these – though grounded in the ultimate *mystery* of the God whom "no one has ever seen" (John 1:18; 1 John 4:12) – are all strictly human ideas and ways of thinking. When the symbol "God" is interpreted as identifying and holding together in one the ultimate mystery of things, on the one hand; and, on the other hand, the serendipitous creativity that expresses itself in the evolutionary/historical trajectory on which humankind has appeared, it can continue to provide a proper focus for human devotion, meditation, and work.

Bringing in the name "God" here does not commit us to the existence of some additional *being* (either in the world or beyond the world) from which this creativity proceeds. What we are doing when we employ this name is calling attention to the distinctive significance (at least for us humans) of the *unity*, the *direction*, and the *creativity* which gradually developed in this particular evolutionary/historical trajectory – features which would later grow deeper and more complex, as human life emerged into what we call consciousness, purposive activity, intentionality, and human creativity. The cosmic forces and movements came into an order here that made it possible for *humanness* to come forth from them. The symbol "God" (with its accent on that which grounds our very humanness) is the principal word available in our language for focusing our minds on this gradually emerging creative trajectory of *humanness and humaneness*. Faith in God-as-creativity – through its retrospective perusal of this trajectory that has produced us humans – discerns and affirms this emerging directionality amid all the enormous diversity of cosmic powers and movements. Thus, the symbol "God" holds together in one that movement into humanness

through which these disparate cosmic and historical powers and forces have produced our human existence.

In using the word "God" in this way, no claim to definite knowledge of how and why this all came about is made. On the contrary, precisely its *mystery* is accented. Here, in and through this evolutionary-historical trajectory, the ultimate mystery of things – serendipitous creativity – discloses a human-affirming and humane-affirming dimension: at least this is what the faith that celebrates these matters as a manifestation of *God's* reality, believes. This belief respecting the ultimate mystery of being and value does not, of course, involve the claim that we humans know what is in fact truly human and humane: it expresses, rather, a commitment to being drawn out – from where we now are, what we now believe, and how we now behave – to new levels of insight, action, and being with respect to these concerns, levels which we now cannot even imagine. With its mythic overtones of mystery and transcendence, the symbol "God" can open us to what is beyond our present comprehension. From a pragmatic point of view, therefore, that is from a point of view interested in the actual reordering of human affairs in more humane and ecologically responsible ways, it is both meaningful and important to employ this symbol.

When the image/concept "God" is understood – not in terms of the specific content that our traditions originally gave it (the imagery of a creator/lord/father), but rather in terms of the evolutionary/historical creativity that has actually brought human life into being and continues to sustain it – there is really no question about whether God "exists." The correct question is, rather, what is *God*? That is, what reality – or configuration of realities – actually gives us our being as *human* and draws us on toward more profound humanization? When the question is refocused in this way, it becomes clear that the name "God" is used here to designate the mystery of creativity – the ultimate reality with which we humans finally must come to terms. What do we really know about this mystery? That again is not the right question. The pertinent questions are, rather: What can and should we *trust*? In what should we put our *faith*, as we live out our lives? Should we trust that unknowable *mystery* that has brought us into being and continues to sustain us? Or should we trust something else, more openly accessible? Faith in God, commitment to God, if understood along the lines proposed here is, I think, of as much importance to us contemporary men and women as it was to those many generations over the centuries who found it indispensable for living a difficult but rich and full human life.

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Chapter 8
"Knowing Too Much Is Knowing Too Little": A Theological Appraisal of the Boundaries of Knowledge

Antje Jackelén

1 Summary

Intuitively we are inclined to say that boundaries of knowledge are an indication of our lack of knowledge: they are about knowing too little. More counter-intuitively, but maybe even more true, I argue that the boundaries of knowledge are not only about knowing too little but also about knowing too much. And this applies to science as well as to religion. Examples from the two areas suggest that both science and religion are marked by internal and external boundaries of knowledge.

Faithfulness to these boundaries of knowledge makes all disciplines truer. In fact, I am convinced that it is precisely the awareness of the boundaries of knowledge that stands for dynamics and creativity; for it is at these boundaries that freedom and constraint meet. They mark the place where hermeneutics flourishes and where creativity happens.

The relevance of this observation is illustrated by three theological case studies: the ways that Christian eschatology has developed for dealing with boundaries; the emphasis on apophatic over against cataphatic theology in the Eastern Orthodox tradition, including the methodological implications of this emphasis; and Nicholas of Cusa's concepts of the *docta ignorantia* (Latin, learned ignorance) and the *coincidentia oppositorum* (coincidence of the opposites).

These examples suggest that there are various ways of dealing with the boundaries of knowledge, leading to differing consequences. Not only do these ways determine our view of knowledge as a whole, they even make a difference for the content of knowledge as such.

2 Internal Boundaries in Science and Theology

I will start from a very simple statement: A boundary poses a limit to something. Hence, boundaries of knowledge would be that which limits our

knowledge. It is a fairly trivial statement to say that boundaries of knowledge exist. It is far less trivial to think about the nature of these boundaries. Intuitively we are inclined to say that boundaries of knowledge are an indication of our lack of knowledge: they are about knowing too little. More counter-intuitively, but maybe even more truly, I want to say that the boundaries of knowledge also are an indication of our knowing too much. Indeed, my point is that boundaries of knowledge are not only about knowing too little but also about knowing too much. And this applies to both science and religion.

I will turn to science first: It seems to be part of the nature of science to be caught between knowing too much and knowing too little. On the one hand, science is driven by a perceived lack of knowledge. Scientists identify gaps of knowledge, devise hypotheses and make them testable. They set up experiments and collect data. Ideally, the information gathered will be processed in a way that closes those gaps of knowledge. A good example of a lack of knowledge that drives science is contemporary cosmology. Cosmologists readily admit that they understand only a minute fraction of the universe, since dark matter and dark energy, which together may be as much as 96 percent of the universe, continue to escape scientific understanding. A lot of resources, including costly particle accelerators, are invested into closing this gap, so far without the success hoped for. Nevertheless, in spite of this enormous realm of dark energy and dark matter that for the time being lies beyond the boundaries of human understanding, cosmologists work with a body of knowledge that never fails to impress the general public. The Hubble photographs and the recent development of the discipline of astrobiology are just two indicators of this.

On the other hand, science is also driven by knowing too much. This "too much" refers to the fact that there always is a host of data that fall outside the domain of currently established scientific knowledge. This can be data that are produced as by-products of experiments or data that fail to make sense within the framework of given theories at a particular time. They may be regarded as irrelevant or as data that suggest a revision of a theory – data of the kind that Thomas Kuhn ([2]1970) considered to be the triggers of what he famously called a paradigm shift. Or, this can be data that are generated more or less routinely by standard research and that cannot be dealt with appropriately. In an electronic age these data can be made available to audiences far away from their origin; hence their use is far beyond the authority and the reach of the people who first produced them, which may lead to interesting and difficult ethical boundary questions. An example of this is the field of molecular biology. Biologists tell us that we have far more information than we ever can deal with appropriately. The genetic data that keep being produced and stored in electronic data banks are so much larger than anybody can handle. This leads scientists to state-

ments similar to this one: We know (= have access to) a lot of data, but we still do not know (= understand) why *x* or *y* seems to be the case.

This constitutes an internal boundary to (scientific) knowledge: a boundary that is certainly movable, but nevertheless indicates that knowing and not-knowing are closely and actively related to each other. Furthermore, this boundary affirms our experience that knowing and understanding are not identical. We can know a lot of data that pertain to a phenomenon, and still not be in a position of really knowing/understanding the phenomenon in question. Therefore, it is helpful to distinguish between the knowledge of information and the knowledge of understanding. At any rate, in science, knowing too much sets a boundary to knowledge – as does knowing too little!

Something similar is the case in religion. Also religion is caught in the tension of knowing too little and too much. Knowing too little is often accompanied by the temptation to take refuge in the concept of the god of the gaps. "God of the gaps" has become a technical term for the idea of placing God in the gaps of human knowledge. The unknown gets referred to God's domain – either in the sense of God's mystery or God's miraculous intervention in natural processes. What seems to be inexplicable according to the best available human knowledge of nature is attributed to God's action. The classical example of a god of the gaps is found in Isaac Newton who explained what in his days seemed to be inexplicable astronomical irregularities by referring to divine intervention. Inadvertently, Newton thus turned God into a weak hypothesis that would be replaced by sure knowledge before too long. Pierre de Laplace's famous statement that, in his own system, he had no need of the God-hypothesis is a splendid illustration of the flaws of the god of the gaps model. What still appeared to be a valid thought construction on the horizon of the dawning eighteenth century was soon transformed into a pile of rubble: a God who is constantly retreating and for whom ever smaller gaps remain in the landscape of that which is not yet fully known and explicable in terms of the laws of nature. Rather than locating God only at the boundaries of the known, theological discourse is and should be about locating God very much in the center of what we know. While the god of the gaps strategy has been largely dismissed as unviable in religion-and-science circles, it may well continue to persist in the thinking of individual believers.

Obviously, the god of the gaps is a trap especially in Christianity. Religions that do not have a concept of a personal God are in principle immune to this phenomenon. Therefore, these things look different in Buddhism, for example. Nevertheless, regardless of the concepts of God, religious believers tend to be well aware of the fact that our knowledge, as finite beings, is always going to be limited. We will always know too little. And – as many believers will add – this is exactly as it should be.

However, knowing too much is something that pertains to religion as well. It is a more common phenomenon in religion than one might think, and it is found on the highest levels of theology as well as in various religious practices. There are examples of theologians who express claims about such things as the inner essence of God's being or about exactly what kind of foreknowledge the thus-defined God may have about future events. In a contribution to a debate about the latter, one theologian distinguishes between five different kinds of possible divine foreknowledge, namely exhaustive definite foreknowledge, present knowledge, simple foreknowledge, complete simple foreknowledge and incremental simple foreknowledge (Sanders: 2003). When such definitions are used to make concrete and detailed claims about what God knows about the future and how God knows it, I would say that we probably have an example of knowing too much before us.

New Testament scholar Krister Stendahl (1984, 193–202) has used the knowing-too-much argument in his critique of the idea of the immortality of the soul. Immortality is too much and too little at the same time, he states. The idea is far too large, because it arrogantly glorifies the human being with individual immortality and claims to know more than is useful. It is far too small because it is too egoistic, too concerned with one's own self, one's own family, or one's own race, thereby forgetting that the New Testament deals with something far greater than the concern about individual identity, namely, with the advent of the reign of God. In this case, knowing too much in one specific respect translates into missing seminal knowledge of greater relevance for the whole picture. Knowing too much can result in missing the point altogether.

On the level of religious practice, knowing too much is an issue whenever warlords proclaim "Immanuel – God is with us" and have cannons and weapons blessed in the name of the Holy One. It is also an issue when millions devour the "Left Behind" book series in search of secure knowledge about the ultimate future. The whole problem of religious fundamentalism is by and large a problem of knowing too much: of knowing that there is only one truth, and of knowing that my truth is *the* truth. It is based on the presumed exact knowledge about God's will and mind, about eternal destiny whether called heaven or hell, and about the moral and political positions that ought to be derived from such knowledge. Overconfidence in the perceived truth can occur in science as well, but generally, the negative consequences of scientific hubris remain limited, whereas religiously motivated overconfidence, especially in liaison with claims to political power, can lead to devastating effects.

Therefore we can say that, similar as in regard to science, there are internal boundaries to religious knowledge. Even in religion, knowing too much sets a boundary to knowledge – as does knowing too little.

This suggests that both scientists and religionists need to be faithful to the experience of the boundaries of knowledge, constituted by knowing too little as well as by knowing too much. Both kinds of boundaries entail risks as well as possibilities: knowing too little or knowing too much can lead to resignation, error or the eager pursuit of research; apart from that, knowing too much can also lead to hubris or fundamentalism. Knowledge is subject to change in several respects. Levels of knowledge are constantly in flux, and so is the language used to communicate knowledge. In many cases, not only the contexts of knowledge but even the content of knowledge is subject to change. This basic insight provides some important protection against the risks of knowing too little and knowing too much. Change of knowledge usually happens through the availability of new data and through successful hypothesizing. This applies to both science and religion. Often, progress in science is taken for granted to a higher extent than in religion or theology. And in this regard, there certainly are differences between these two fields of knowledge. Yet, even theology is relentlessly on the move: simply consider the fact that in order to give voice to the same thoughts and ideas over the course of several centuries, the language of theology has to go through considerable changes. In that respect, one may come to compare theology to that duck, which, seemingly floating immovable on the surface of a river, is paddling frenetically under the surface just to stay in the same place. Over and above linguistic changes, growing and changing knowledge about the historical sources and their contexts as well as about the structure of the universe and the dynamics of an increasingly globalized world have provoked substantial changes in theology that are not entirely different from changes in science.

Faithfulness to the boundaries of knowledge makes all disciplines truer. The attitude towards these boundaries has significant consequences for how science and theology are done. The most obvious consequences are inhibitory in character – marking the line of demarcation between known and unknown that is valid in a certain place and at a certain time. But there is more to boundaries than that. I think that faithfulness to the boundaries of knowledge also has a genuinely positive impact, because it is exactly the awareness of the boundaries of knowledge that stands for dynamics and creativity. It is at these boundaries that freedom and constraint meet. And that is precisely the place where hermeneutics flourishes and creativity happens. This applies to internal boundaries a well as to what I will call external boundaries.

3 External Boundaries

I call external boundaries of knowledge those boundaries that to the best of our knowledge are non-negotiable. We do not know, not because we do not yet know, but because we cannot know. This type of boundary is not contingent on the limitations of available methods and measurement equipment. If this were the case, the boundary would not exist in principle, but only for the practical constraints on our capacity to gather and monitor knowledge. Instead, the external boundary is intrinsic to the way things are. It is a matter of principle, not of practicality. However, it belongs to the condition of human knowledge that there is no universal agreement on where these external boundaries really run. The ongoing discussion about different interpretations of quantum physics offers an excellent example of this problem. Debates on different kinds of realism and non-realism in philosophy present another illustration of the difficulties at stake.

But rather than getting into the intricacies of either physics or philosophy, I will choose an example from cosmology: the future of the universe seen through the lens of our solar system. We know that about 4.5 billion years down the road, our sun will die and become a white dwarf. If not before, so at least in that process all carbon-based life will perish from what we today call the Earth. Whatever scenario we can think of, the far future of the universe does not look good for the survival of life as we know it. Cosmologists can develop theories about the future of the universe, but we simply cannot know what is beyond the death of life and the death of the universe. There is an external boundary to what we can know.

It turns out, however, that both internal and external boundaries impact the human mind in similar ways. The perception of internal boundaries triggers the mind to push these boundaries further into the territory of the hitherto unknown, thus expanding the realm of the known. Since this is an impossible strategy for external boundaries, the mind has developed other strategies for border-traffic across external boundaries. Human thought does not stop at external boundaries. Quite the contrary, we find it utterly interesting to raise questions that transcend that boundary, that is, to deal with transcendence. And we surmise: If the universe is truly a cosmos and not ultimately simply a chaos, it must have some destiny beyond its death. At the same time we know that science is unable to speak of what might lie beyond the decay of the universe. The scientific knowledge we have is built on the validity of the laws of nature we know apply to everything we know about the universe. We have no way of collecting and testing empirical data from a system where those laws do not exist, where totally different laws apply or where the concept of law as we understand it is meaningless.

Is that why transcendence usually gets referred to the realm of religion? Does the religious believer know better than the scientist? No, in the strict

sense of the word, the religious believer cannot know either. Nevertheless, people of faith are known to make statements that go beyond the reality of the natural world. And not only do they make theoretical statements, they tend to base their choice of lifestyle and decisions about their deepest commitments on what they take to be knowledge about the transcendent. Is this a thoroughly nonsensical behavior? Are these statements and choices totally out of touch with any kind of data? As a theologian, I will argue that even in this case, we deal with data, namely in the literal sense of data as that which is given, and we deal with the challenge to find the most adequate interpretation of these data. In this area of knowledge – as in science – multiple interpretations are possible. And there are reasonable criteria to distinguish between stronger and weaker candidates of truth. I will exemplify this with Christian eschatology. Traditionally understood in terms of teachings about "the last things," eschatology presents itself as a superb case in point: the attempt to deal constructively with an external boundary of knowledge.

4 Christian Eschatology as an Example of Dealing with Boundary Issues

Science usually attains new knowledge by way of extrapolation: new knowledge is gained by extrapolating from the old, from that which is already known. On the basis of the known, new questions are asked, new hypotheses framed and tested, which eventually and ideally leads to the modification of old knowledge. In many ways, theology does that too. For instance, exegetics, the discipline of interpreting the Bible, works very much in this way. In addition to gaining knowledge via extrapolation, theology operates with a different category; it also uses the category of promise. This adds something to the methods of theology that distinguishes it from science.

Christian theology claims that the future is not only that which we can calculate and extrapolate on the basis of the past and the present. The future is also what comes to us from ahead, as it were. Some theologians distinguish between two kinds of future: future understood as *futurum* is future as we can predict it on the basis of that which is known; future as *advent* is future understood as that which comes to us from what is ahead, incalculable and surprising. The only way we can speak about future as advent is by grounding our talk in the category of promise. According to this distinction, the goal of eschatology is not to find the most probable description of future realities and the attempt to do so with ever increasing levels of exactness. Rather it is about finding the most adequate articulation of what we may hope for.

Building on the category of promise gives priority to the possible over against the real. Eschatological epistemology requires us to acknowledge

the primacy of potentiality and promise. Put differently, eschatological thought insists that the seemingly ultimate is never more than the penultimate at best. One might say that eschatology remains the great exercise in the school of penultimacy.

By no means does this insight diminish the qualities of any knowledge, and certainly not the merits of scientific knowledge, but it puts such knowledge in its right proportions. This means, for example, that modern physics and cosmology are indispensable for articulating an intelligible eschatology. They should be given much more attention than hitherto has been the general practice in presentations of Christian eschatological thought. Among other things, this would help eschatology to reflect critically on the consequences of its anthropocentric and geocentric constraints. Yet, there is of course more to Christian eschatology than physics and cosmology. Eschatology should have a substantial level of consonance with physics and cosmology, but it cannot be derived from physics and cosmology.[1]

To put it somewhat bluntly: From a scientific point of view it may suffice to discuss flowing time versus the block universe, but from a theological point of view, the physical world matters in additional ways. Christian eschatology must also include the physical world of a Salvadoran woman who receives 29 cents for making a shirt that a well-known brand company sells for $45 to the National Basketball Association in the United States (Sobrino: 2004, 60). The relativity of space – between the space of the woman and the space of those who share the remaining $44.71 of the shirt's retail price – is as crucial to eschatology as the relativity of time. It is the eschatological space-time-continuum, as it were. Or one might say: in terms of physics, special relativity has got to be the limit case for how we think and speak about time. In terms of eschatology, both God as the source of time and eternity and the Salvadoran woman are limit cases. Theologically, the question of how God can act in a world governed by the laws of physics cannot be isolated from the question of what God can do through you and me for the "29-cent-woman" and her sisters and brothers. Thus, eschatology raises the question of hope. In the example mentioned here, eschatology does so especially in face of cultures that mask their inherent despair with systems of security and consumer happiness which inevitably fail when taken to be ultimate.

This view of eschatology represents significant progress in knowledge compared to eschatological thinking that is preoccupied with a schedule for the end times and guesses about the *parousia* (Greek, second coming) of Christ or speculations about a rapture and violent reckonings at Armageddon. Similarly, a "pie-in-the-sky" eschatology as well as a "roast-in-hell"

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[1] For a discussion of the relationship of eschatology and modern physics, see Jackelén: 2006.

eschatology needs to be counted among outdated eschatological concepts. Both are betrayals of divine and human dignity alike, to say the least. The task of eschatology is much more urgent. Driven by the question "what may we hope for?" eschatology must be dedicated to the reshaping of modern cultures that are in danger of losing life-affirming and life-sustaining traditions and practices. Just because and by way of their consciousness of the radical inaccessibility of the ultimate, eschatological theologians gain insights and knowledge that are of great significance for the penultimate, that is, the reality at hand. The engagement with both internal and maybe especially external boundaries can birth relevant knowledge for life within those boundaries.

To take this example one step further: Eschatology is about gazing through the disguises that mask our cries for security and compel us to consume away our anxiety. Expressed in more general terms, eschatological knowledge implies the radical questioning of every system, even systems of knowledge; it has dedicated itself to the incalculable. In this, it is radically different from scientific knowledge. Science is and must be dedicated to the calculable, and to the construction of systems. Eschatology is the permanent crisis of all systems instead. For eschatology in particular is valid what Karl Barth said of theology in general:

> *As theologians we ought to speak of God. We are human, however, and so cannot speak of God. We ought therefore to recognize both* our obligation and our inability *and by that very recognition give God the glory.* This is our perplexity [Bedrängnis]. Compared to this, everything else is child's play. (Barth: 1929, 158; English translation by the author, emphasis in original)

Thus eschatology can become a way of dealing with boundaries of knowledge that transforms such boundaries into places where hermeneutics flourishes and where creativity happens. In the best cases, by engaging the boundaries in such a way, hope is created, and the dignity of life is recreated into greater wholeness. Respecting and transcending boundaries can create existential knowledge that is essential to living. It goes beyond scientific knowledge without calling the significance of such knowledge into question. A more traditional way of expressing this is to say: we have to be wise, in addition to being knowledgeable. And this implies giving priority to possibility and promise over impossibility and imprecation. That certainly is a trait of wisdom or enlightenment – at least according to some of the definitions of enlightenment that are applied in Buddhism.

5 *Apophatic Theology as an Expression of the Boundaries of Knowledge*

A colleague of mine, a physicist, once remarked jokingly: "An article in a physics journal almost never refers to a paper older than ten years or so, unless it is an article on the history of physics. You theologians insist on quoting the whole gamut of church fathers and medieval theologians all the time. Do you never learn from their mistakes so that you can leave that stuff behind you?" "Well," I tried, "it's not that we are not learning and making progress; it's our training in humility! It seems that we can't do good theology without reminding ourselves of the treasures and the aberrations of the past."

Eastern Orthodoxy is the branch of Christianity that has been especially careful in respecting the heritage of the past. Up to this day, Eastern theology keeps very close to the writings of the Church Fathers. The same tradition has also cultivated a special reverence for the boundaries of knowledge. Eastern theology has taken a route quite different from that of Western theology. The latter was deeply impacted by at least two movements that did not shape Eastern theology, namely the Renaissance and the Enlightenment. These pushed Western theology more firmly into the direction of cataphatic theology, where the rational penetration of every theological concept becomes a superior goal. Whereas right thinking is the center in much Western theology, right worship and liturgy becomes the linchpin of Eastern theology, to say it somewhat simplified. This difference finds expression in the Eastern preference for apophatic theology as a way of respecting boundaries of knowledge.

These boundaries are overwhelmingly obvious in regard to our knowledge of God. On the one hand, theologians argue that God has not left us in ignorance about Godself. On the other hand, in regard to the divine essence, we are stuck with incomprehensibility. Because God is infinite and we are finite, there is no way that we can know God's essence, as Gregory of Nyssa has it (see Pannenberg: 1991, 342f). The boundary between finitude and infinity can only be crossed from the side of infinity, which is what happened in the incarnation of God in Jesus Christ. The boundary cannot be crossed from the side of finitude. One might also say: the infinite can be communicated to the finite only by way of revelation. Thus, one may say that, as revealed knowledge, the infinite can show up in the finite. This is the only way that we can say *finitum capax infiniti* (the finite is capable of the infinite), to use a formula from the Lutheran tradition. The reverse is not possible, though: there is no way for the finite to show up in the world of the infinite – not unless these natural bodies have been transformed into *somata pneumatika*, spiritual bodies, to use the resurrection language of Paul (1 Cor 15).

The divine essence is unknowable not only because of its infinity but also for a second reason. The divine essence is to be radically distinguished

from everything that is created, as argued by such influential theologians as John of Damascus, Dionysius the Areopagite, and Gregory Palamas. In spite of revelation and incarnation, there is a sense in which God's absolute transcendence remains ultimately hidden. It is by way of negation and silence, by apophatic theology, that Orthodox theology expresses its respect for God's transcendence. Positive theology, cataphatic theology, has its given place. It is not wrong to make statements like "God is good, wise, just, etc.," but such statements need to be balanced by the apophatic insight that God's inner being is unknowable to us.

Yet, the emphasis on the apophatic does not cut off the transcendent God from creation. While God's essence remains beyond the reach of our knowledge, God's presence is everywhere. God's energies, who are God, permeate all creation. According to Eastern Orthodox teaching, they are experienced in the shape of deifying grace and divine light.

The interplay of apohatic and cataphatic theology is not merely a question of theological epistemology. It also leaves its deep impression on the articulation of Orthodox spirituality. Without any understanding of the apophatic and cataphatic elements of theological knowledge one will find expressions such as "an imageless vision" or "luminous silence" utterly nonsensical.[2] Yet, these are terms full of meaning to the one who understands the epistemological system of apophatic and cataphatic theology. Within that framework such terms can successfully communicate the spirituality characteristic of the Byzantine tradition.

Again and again, the opposites seem to touch each other or even to coincide. Vladimir Lossky's description of the apophatic theology of Dionysius the Areopagite is a case in point:

> Knowledge of God can only be attained by going beyond every visible and intelligible object. It is by ignorance (*agnosia*) that we know the One who is above all that can be an object of knowledge. It is not divine gnosis which is the supreme end, but the union (*henosis*) that surpasses all knowledge. As with St. Gregory of Nyssa, so also with Dionysius *theoria* is not the summit of the ascent toward God. (1983, 122f; transliteration of Greek characters in original supplied by the author)

Lossky speaks of "the entry into darkness (*skotos*), an entry concealed by the abundant light through which God makes Himself known in His beings." The logic of these statements rests on the insight that God does not exist in the common sense of the word. Rather, God is conceived of as "superior to all oppositions between being and non-being." (ibid., 123)

Even though this conceptualization is particularly characteristic of Eastern Orthodox tradition it is not unknown elsewhere. Dismissing the apo-

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[2] See McGuckin: 2001, who uses "imageless vision" in his portrayal of Evagrius Pontike and speaks about "the luminous silence of hesychasm."

phatic as the idiosyncrasy of one specific tradition would be an improper conclusion. My third case study therefore deals with a similar, equivalent example from the Western tradition.

6 *Reconciling boundaries:* Docta ignorantia *and* coincidentia oppositorum

Docta ignorantia, learned ignorance, and *coincidentia oppositorum*, the coincidence of the opposites, are central terms in the writings of the German cardinal and polymath Nicholas of Cusa (1401–1464). In a letter of dedication at the end of Book Three of his *De Docta Ignorantia* (On Learned Ignorance), Cusa remembers his discovery of learned ignorance: "… when by what I believe was a celestial gift from the Father of Lights, from whom comes every perfect gift, I was led to embrace incomprehensibles incomprehensibly in learned ignorance, by transcending those incorruptible truths that can be humanly known" (Bond: 1997, 206).

The wording is noteworthy: to embrace incomprenhesibles incomprehensibly (*ut incomprehensibilia incomprehensibiliter amplecterer*). Apart from the fact that the verb "embrace" suggests existential involvement of the whole person in a physical act, we also witness a dynamic interplay between the love of knowledge and the affirmation of ignorance. Cusa asserts: " … since the desire in us for knowledge is not in vain, surely then it is our desire to know that we do not know. If we can attain this completely, we will attain learned ignorance … . One will be the more learned, the more one knows that one is ignorant." (Bond: 1997, 89; *De Docta Ignorantia*, Book 1, Chapter 1 [4]) Not only do we hear an echo of Socratic wisdom here. It is also worth noting that Cusa gives preference to the "that" over against the "what." It seems to be more important to know that we do not know than to think about what it is we do not and cannot know. It is knowledge and respect of the boundary more than real and speculative knowledge that is the source of wisdom. Here again, the boundary emerges as a place where hermeneutics (although Cusa would hardly have used that word) flourishes and creation of wisdom happens.

However, this does not relegate wisdom exclusively toward an imagined demarcation line between immanence and transcendence running somewhere out there. Cusa's two key concepts express a much more sophisticated balance between immanence and transcendence. Whereas learned ignorance comes across as a heavenly gift, the other concept is more likely to be a noble fruit of human intellectual activity. The *coincidentia oppositorum*, the coincidence of the opposites, actively involves the work of the intellect. Both aim at the same goal: a more perfect knowledge than the purely rational one. Both refer to the combination of intellect/rationality

and mysticism, intellect and emotion/intuition. "Therefore, we say that the sound and free intellect knows as true that which, from an innate searching, it insatiably longs to attain and apprehends in a loving embrace. For we are convinced that no sound mind can reject what is most true." (Bond: 1997, 88; *De Docta Ignorantia*, Book 1, Chapter 1 [2]) Once again, Cusa brings love and knowledge together. In the previous quote, he spoke of embracing incomprehensibles comprehensibly. Here, he speaks of the intellect that longs and apprehends in loving embrace. In Cusa, knowledge and love belong together. Of course, this was almost 200 years prior to Rene Descartes, who is usually credited for an anthropology that builds on a strict distinction between the rational self and the emotional self and thus between knowledge and love. While Cartesian anthropology is taken to require the neat separation of a cool mind from a warm heart in order to ensure rationality, Cusa sees the unity of mind and heart as a superior way of knowledge. Recent research in neuroscience supports the claim that Cusa may be more right than what has come to be known as the Cartesian perspective would suggest (cf. Damasio: 1994).

In my opinion, Cusa's view of the boundaries of knowledge has interesting consequences for the interpretation of knowledge about the world and the cosmos. Here is my example: In his treatise *De Docta Ignorantia*, Cusa initiates a critical shift in the view of the universe. One may say that here, for the first time in Western cosmology, the universe loses every center. Neither the earth nor the sun, as even Copernicus still had believed, is the center. In this respect, Cusa preceded the so-called Copernican revolution.

Strikingly, however, Cusa does not interpret the loss of a privileged location at the center of the universe as anything negative. It may have been his love of the apophatic surplus that marks all true knowledge that prevented him from any negative associations combined with the insight that the earth and thus humans are not at the center of the universe. At any rate, he is far from the interpretations that Friedrich Nietzsche and Sigmund Freud were to give the Copernican Revolution in the nineteenth and twentieth centuries. In *On the Genealogy of Morals*, Nietzsche speaks of a process of human self-diminishing since Copernicus; humans are turned into animals, a development that instills in them a sense of nothingness. Freud speaks of the three narcissistic assaults on the human ego. The first one is the loss of the center position in the universe, the second is the loss of the position of the crown of creation due to Darwin's theory of evolution, and the third is Freud's own theory of the power of the unconscious which has the ego lose sovereignty in its own house, as it were. Both Nietzsche and Freud saw as a loss what Cusa preferred to envision as a question of equality. Here we are confronted with similar insights, yet very different evaluations of the perceived knowledge and of the boundaries of knowledge. Why could Cusa attach a positive value to that which was perceived in negative terms by others? It seems to me that

two aspects of Cusa's thought are responsible for this difference. First, it is his treatment of the boundaries of knowledge within a framework of love that makes him avoid the track that would lead to the idea of narcissistic assaults. Second, the idea of *docta ignorantia* paves the way for an attitude that can embrace the idea of knowledge with confidence, while at the same time always keeping the door open for the other, for the surprising – for both that which shows up unexpectedly in the sphere of the known and that which remains within the sphere of the apophatic.

7 Conclusion

These three case studies from Christian eschatology, Eastern Orthodox theology, and the writings of Nicholas of Cusa have shown that boundaries of knowledge, whether they are internal or external, can be dealt with in differing ways. The engagement of external boundaries in particular impacts the way epistemology is framed. This has consequences in various areas of knowledge.

In science, growing awareness of the boundaries, particularly helped by developments in physics during the twentieth century, has strongly contributed to the decline of the influence of a positivistic framework. In light of the boundaries of knowledge, scientific self-sufficiency appears to be an illusion. Interdisciplinary approaches within the sciences are encouraged and the need for science to relate to other areas of knowledge and action, such as ethical discourse and decisions, becomes obvious. A constructive engagement with the boundaries of knowledge also goes together with heightened awareness of pre-scientific assumptions that influence and sometimes even guide the course of science. Overall, the role of hermeneutics in the exercise of research and the communication of science is emphasized in relevant ways.

Also in the realm of religion, a constructive engagement with the boundaries of knowledge is capable of protecting against overconfidence and hubris. It supplies a necessary critique and alternative to fundamentalist claims. It also keeps the awareness awake that we are dealing with the ultimate always and only in the context of what is penultimate at best. From this emanate both humility and freedom: an epistemological humility, because of the permanent presence of what I have called the apophatic surplus, and the freedom to seek knowledge as well as to err, because eschatology as a way of dealing consciously with the boundaries of knowledge offers a language of hope beyond the limitations and aberrations of human knowledge.

The conclusion that we can choose to deal with boundaries of knowledge in a variety of ways may sound trivial at first glance. However, as exempli-

fied by the comparison of Cusa, Nietzsche, and Freud, the choices that are made reflect not only on interpretations of what is at hand but even on the content of the knowledge that is handed on as well as on the pursuit of further knowledge. The understanding of current knowledge, its integration into a consistent worldview as well as its application to programs of inquiry and research projects depend on how we see and deal with internal and external boundaries of knowledge. Even though the choice of attitude itself may not seem all that significant, its consequences can be momentous.

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Chapter 9
The Oddest Word:
Paradoxes of Theological Discourse

Tom Christenson

THE THREE ODDEST WORDS
When I pronounce the word Future,
the first syllable is already in the past.
When I pronounce the word Silence,
I destroy it.
When I pronounce the word Nothing,
I make something no nothing can hold.
Wislawa Szymborska (1998)

1 *Introduction*

Why did the Nobel Prize winning poet not include the word "God"? It may not be odd in the same way as the words she chooses, but surely it is one of the oddest words. I would even say it is *the oddest word*. Like the words she chooses, it's a word that transcends itself, critiques itself, perhaps even cancels itself. It is at once tempting and disorienting. How, then, is it a word that can be spoken? How can it even be thought? What care or what careless abandon, what seriousness or what insane sense of humor, what knowledge or deep ignorance, what wisdom or sublime foolishness is required to speak such a word?

In this chapter I wish to examine the possibility of theological discourse (talk to, with, or about God). It is my thesis that theological discourse is language at the boundaries of sense and nonsense, understanding and foolishness, knowledge and ignorance. The puzzlement we find in theological discourse should be occasion for utmost carefulness, but it is not occasion for despair, for both the puzzlement and the ignorance at the boundaries of human speech are perfectly appropriate given the uses that theological language serves and the risks it unavoidably runs. Nicholas Lash's words should serve as a caution: "It is the tragedy of modern Western culture to have fallen victim to the illusion (widely shared by believer and non-believer alike) that it is perfectly easy to talk about God." (2004, 84)

The method of this presentation is to look at several temptations we encounter in our use of theological language and the perplexities that arise in our attempts to avoid them. We will wish to note how theological discourse resembles and differs from other language uses (particularly in the sciences). Finally we will wish to attend to the engagement with dimensions of transcendence that occurs in such boundary situations. The essay will conclude with a suggestion about how theological discourse works such that what might otherwise be taken as failures (of knowledge, meaning, wisdom) may be seen as practical and perhaps even appropriate.

2 *Five Temptations*

2.1 *The Temptation of Supposing That One Is Saying the Last (Or the First) Word*

Maisie Ward quotes G. K. Chesterton as saying:

> It may, perhaps, be wondered whether one could possibly say a worse thing of anybody than that he had said "the last word" on a subject .... [Such a person] is a murderer; he has slain the topic. The best kind of critic draws attention not to the finality of a thing but to its infinity. Instead of closing a question, he opens a hundred. (1952, ix)

Some kinds of inquiries, at least, seem closable. Every month I try to balance my checkbook, sometimes I complete that task when I am able to reconcile my bookkeeping with the bank's. Sometimes I quit in exhaustion. It would be silly to fault myself for bringing closure to the process. I close the inquiry, but not always because I believe that I have the correct answer but that I have an answer I can live with.

But there are also some kinds of inquiries where even the pretense of closure is a symptom of lack of understanding. Philosophical inquiries can be like this, also theological ones. Understanding comes, if at all, when we realize something arbitrary or even mistaken about the way we have framed the question or framed the inquiry itself, i. e. insight comes when we learn, in our thinking, something about our fallibility as thinkers, and the need to start again.

In philosophy and theology the difficulty (impossibility) is not just in saying the last word but also very often in saying the appropriate first word. Or to put it another way, the last word we say should be to question the way we framed the first words we said. Descartes wanted to begin philosophy with propositions that functioned like the axioms of Euclid's geometry. If only he could state those axioms clearly and demonstrate their indubitable truth absolutely then philosophy would be set on a firm foundation and real progress in human thought would be possible. In at-

tempting to say those first words, however, Descartes did not ask himself with sufficient rigor what his choice of a mathematical paradigm implied, nor whence sprang his desire for certitude. Nor did he question whether Euclid's axioms were the model of certitude he supposed they were. Nor did he notice how influenced he was in his thinking by the grammar of the languages he knew, nor his dependence on the communities of persons in whose midst he had learned them. Had he had such understanding he would not have succeeded at his inquiry, but he would have understood better his own lack of success.

In Plato's sublime dialogue, *Meno*, Socrates and a slave boy pursue the question, "What will be the length of the side of a square that has the area eight?" What they discover is that the answer is not expressible in terms of the original units of measurement. It is not 3 units, nor 2½, nor 2¾, nor any rational number. Yet the answer is seeable (it is the diagonal of a square of four units) and definite. It just cannot be expressed as a function of the original vocabulary of the problem. I take it that Plato's point in using such an example is to give courage to the frustrated student who cannot say the answer. Rather than finding the inability to answer as justification for abandoning the inquiry Plato would have us see that what we need to do is to start again at the beginning. The key lies in the way the question was asked, the way the problem was formulated. The first word cannot be the first word because it isn't a word we are done saying yet. This is as true if the first word is a question as it is if it is an assertion.

For a very long time scientists pursued knowledge of the ultimate particle, the indivisible (*atom*) from which all divisibles were made. This was the original meaning of *atomos* in Greek. In the nineteenth century we finally figured out that even atoms had parts and then the search for the fundamental particle began. Insight in the sciences has now, however, taken a new direction. We no longer pursue the quest for the fundamental particle because we realize that both "fundamental" understood as "not further analyzable" and "particle" are handicapping assumptions. The sub-atomic structure is more like a field of forces that may be analyzable in ever so many ways.

What are we pursuing in our quest for God? Is the God that atheists deny the same God that the believer affirms? Are people who engage the God versus science debate asking the same question? Ought we, following Plato's direction, go back to the beginning and see our mistake not in our failure to answer definitively, but in our posing of the wrong questions? Is this what insight looks like in theology and philosophy when it occurs? Does theology (as the temptation to say a foundational word) rest on a mistake? Do we err in speaking or do we err in keeping silent?

2.2 *The Temptation of Power That Comes with a Higher Authority*

When I was a kid living in a Cold War world, I convinced my neighborhood gang that we had been recruited by the FBI to be counter-espionage agents. I claimed that an FBI officer had contacted me and had asked me to organize the gang to be neighborhood watchdogs for suspicious persons and activities. I told them I was agent FYA250 and they each had a number too, being agents FYA251, 252 ... in the FBI Youth Agent Corps. I had bi-weekly meetings with my superior and he gave me orders to pass on to the troops. We had passwords, secret codes. The gang enjoyed the "insider status" that membership in this group brought. I enjoyed the authority and power it gave me. I was clearly connected to a higher power, a higher authority, a transcendent good. This worked very well for the better part of a Minnesota summer, fall and winter until one of the kids blabbed about his agent designation and duties (trying to get out of running errands for his mom) to his parents and they called my parents and the whole make-believe fell apart. (My final argument with my friend's mom was, "But don't you care about the security of our country?") But oh was it fun while it lasted!

Now just imagine the fun of constructing such an authority structure in adult life. I could be in contact with the transcendent authority and everyone else would have to come to me to decode their instructions from the ultimate (or penultimate) source. Do I play out such a scene every time I teach Aristotle or Kant to my students in a university ethics class? Even if I have not seen *The Good Itself*, I have studied with those who studied with those who did. Is the pastor playing this power game with her congregation? Does she make an implicit "God and I think ..." inference in the weekly sermon? Does the engineer play the authority game with those who use technology without understanding how it works? Does the scientist employ it when he speaks the language of quarks and super-strings with those of us who live in the cave of illusion?

Friedrich Nietzsche guessed that in this sense of power lay the motive, the *eros* behind a whole lot of human activity including morality, religion, and science. Whether the ultimate source is truth, goodness or God, the expert is put in a position of both authority and power. Not just anyone can translate from Pali or Hebrew or Quantum Mechanics. When we become aware of the power game that such knowledge tempts us to play can we, then, caring about truth, goodness, God, speak the language of transcendence? In other words does theology (as a transcendence-based word of authority) rest on a mistake?

The flip side to this temptation is that skepticism and suspiciousness (including self-suspiciousness) suppose a concern for goodness and truth that transcend any particular expression of it. Nietzsche saw that. Skepticism doubts the truth or adequacy of our accounts, suspiciousness doubts the

motives that inspire such efforts. But in both cases the activity of doubting springs out of a concern for truth or goodness. "Can I genuinely pursue truth or goodness if my well-hidden motive is power?" Such suspicion and skepticism do not undermine truth and goodness, they pre-suppose them. The suspicious and skeptical inquirer discovers himself to have a closet passion for both truth and goodness! But, please notice, this is not, as some philosophers have thought, a refutation of either skepticism or suspicion. The fact that both pre-suppose some transcendent concern for truth and goodness does not imply that any account of truth or goodness is either true or good. This is not a real paradox, only an apparent one. An older student of mine in a philosophy of religion class said to me, "You're so skeptical of religious claims. Don't you believe in the absoluteness of God?" I responded, "I do, and that's why I am so skeptical of any human account of God."

Gary Gutting, in *Religious Belief and Religious Skepticism*, writes, "true religious faith is in fact a religious skepticism." (1982, 9). I would add, "and honest skepticism turns out to be a form of faith." Wouldn't it be something if the best argument for the ultimate transcendent was made by Friedrich Nietzsche?

2.3 The Temptation to Not Notice How Much of Our Knowledge Consists in Naming Our Ignorance

When I was a junior in high school I took a course in physics. One day the teacher was trying to explain to us Bernoulli's principle, "that a faster moving fluid will have a lower pressure than a slower moving fluid," or to use the case we are most familiar with, moving air has a lower pressure than standing air. This principle is manifest in the fact that cigar smoke goes out the car window, that an airplane wing has lift, that it's possible to sail a sailboat into the wind. He showed us several experimental examples of this. When he turned back to the class I asked him, "Sir, why does this occur?" He responded, "Because of Bernoulli's principle." I said, "Yes, we know that, but why is that true?" He more loudly answered, "Because a faster moving fluid has lower pressure than a slower moving fluid." I could see he was getting upset, but I decided to try one more time: "But why does that happen? Why does the motion of the fluid affect its pressure?" Angrily he repeated, "Because of Bernoulli's principle." At that point I said, "It seems to me that's just a name for our ignorance. We've given the phenomenon a name and have supposed that the name is an explanation." At that point he'd had enough of my impenetrability and said, "You're nothing but a goddam philosopher."

Well, I didn't at that time know what a philosopher was, but I could tell from his tone and the accompanying adjective that it wasn't anything

good in his estimation. But, of course, it turned out he was right. Since then I have taken it as a sign of the philosophical gift (or curse) that one is not likely to accept explanations that are very commonly accepted, and that one is inclined to notice "explanations" that are really "names for our ignorance." "Gravity" is surely one such conception, "weakness of will" is another, "post traumatic stress disorder" is another, "male pattern baldness" another. Each of these names a phenomenon, but names it in a way that pretends to explain it. The fallacy lies in that pretense.

The example of my physics teacher is not meant to caricature scientists or science instructors. There is certainly more that could be said by a competent teacher in such a case. I'm also not arguing that such conceptions are useless (in many cases far from it), what I am doing is claiming that they are not explanations (in the usual sense) and they certainly are not causes. What they do is group phenomena into a class, i.e. they function as names or a short-hand references to implied explanations. But by themselves they are names that do not explain – so isn't it appropriate to refer to such as "names for our ignorance"? I believe there are manifold examples of this and they exemplify our temptations to turn confessions of ignorance into claims to know.

One day in a class discussion my students asked me whether I believed in UFOs. I said that I did. They asked me why and I responded that I believed in them because I had seen them. They were awed by that response and said, "Really? You've actually seen UFOs?" I said, "Yes, hasn't everyone?" All of them replied, "No way." Then I said, "Do you mean to tell me that you've never seen anything moving up in the sky that you didn't know what it was?" They said, "Oh sure." "I said, "Well, isn't that what UFO means? A flying object that we don't know the identity of?" They said, "Yeah I guess, but we meant spaceships, little men from mars, abductions, stuff like that." What they, like most of us, had done is take a phrase that means "I don't have a clue what it is" and turned it into a name for something they supposed that they understood.

Several years ago while I was participating in religious ceremonies on the Yankton Dakota reservation in South Dakota an anthropologist came up to me and said, "I heard you are a philosopher." I said, "Yes, that's right." Then she said, "I see you participating in the ceremonies, songs and dances of the community. Do you really believe in Wakan Tanka to whom these ceremonies are addressed?" I answered that I did. She asked me, "Why? Why would a sophisticated academic believe in such a thing?" I answered, "Because there are so many things in the world I just don't understand." She looked at me quizzically and said, "How is that a reason for believing in Wakan Tanka?" I said, "Remember that Wakan Tanka in the Dakota language means 'the great mystery.' What better reason is there than deep puzzlement and wonder?" Here once again a language devised to express

deep unknowing and wonder is appropriated as the name of something we think we understand, a god or something we're eager to place in a similar conceptual box.

Does theological language operate this way? I think that in very many cases it does. Whether one uses "God" or "the prime mover" or "the ultimate transcendent" we have attempted to turn into an answer something that is, if we were very honest with ourselves, a question. It's similar to answering the question "What's the length of the side of a square that has the area 8?" by saying "the square root of 8." That's an answer (and probably the right answer on a math test) but only until we notice that it's just the question repeated. Neither the profundity of the question nor translating it into a technical jargon qualifies it as an answer. Does theology (as a claim to have answered a question) rest on a mistake?

But conceptions like Bernoulli's principle, gravity, and the square root of eight are far from useless. It is important to notice what legitimate work such names for our ignorance actually do. The square root of eight is not a finitely expressible number but it does point us toward a process for approximating a number. It is a question more than an answer, but it is the question stated as a kind of place marker that can function in mathematical reasoning resulting in useful knowledge.

"Gravity" functions to make us see a wide range of phenomena as basically related. We see the falling of a stone and the behavior of sun, moon, planets and stars as examples of the same thing. That turned out to be a radical re-visioning in the history of science. So though the question about the stone's falling or the moon's not flying off into space is not directly answered by answering "gravity," the conception is essential to the new way of seeing that modern physics required.

"God" may be as much a question as an answer (I would say much more so) but it may in spite of this (because of this?) occasion a radical re-visioning. Noting that a term functions as a name for our ignorance is certainly a relevant criticism of it, but it is not a fatal one. The question to ask about such "names for our ignorance" is "What do they allow us to see? What are we now empowered to do?"

2.4 The Temptation of Mistaking Linguistic Facility for Understanding

This is the temptation of supposing that linguistic facility is a sign of or substitute for understanding. When I was a very young child I became a theological prodigy. While my older siblings were reciting their confirmation lessons I, aged four or five, was listening to their stumbling recitations and absorbing it all. Being fairly empty-headed at that age I memorized all that stuff before they did and earned the amazement of my parents and

the undying resentment of my older siblings by rattling off the whole of Luther's catechism by memory. After that I was frequently called on to repeat the performance in front of any company that my parents thought would be impressed by it. Finally the pastor set me to performing this feat in church and Sunday school. Of course I did not know what I was talking about. I could recite Luther's question, "What does this mean?" as well as the answers he provides, but I did not know what any of it meant. In many cases I still don't. Since then I have been suspicious of glibness, theological or any other kind. Glibness is certainly not a sign of understanding.

Through most of my life I have assumed that an empty glibness was the problem, a problem that a good theological education might cure. But therein lies a very large assumption, the assumption that something like theological understanding is possible, that one can come to understand God, creation, redemption, sanctification, etc.

Kathleen Norris, in her book *Amazing Grace*, argues that we shouldn't worry about our lack of understanding what we are saying in religious contexts, nor should we worry about our inability to believe it. When she returned to church after many years she was greatly bothered by the fact that she didn't understand very much of what was being said, and what she did understand she didn't believe. The creeds in particular, she writes, " ... seemed like a grocery list of beliefs that one has to comprehend and assent to fully before one dares to show one's face in church." Upon her confessing this her priest said to her, "Don't worry about it." Her argument is that neither understanding nor believing (at least in the usual sense) is necessary for the life of faith. That may come later, she suggests, but they certainly are not prerequisites. She writes:

> As my own relationship with worship and the creeds began to mature, I came to consider that the creeds are a form of speaking in tongues. Now, when I ... remember to include a creed in the worship service, I usually select the Nicene Creed, because then no one can pretend to know exactly what they are saying: "God of God, Light of Light, Very God of Very God." It gives me great pleasure to hear a church full of respectable people suddenly start to talk like William Blake. Only the true literalists are left out, refusing to play the game. (Norris: 1998, 206)

I'm willing to accept her argument to a degree, particularly if like Norris herself, one is aware of not understanding what one says. The fallacy comes at the point when we have confused our facility with understanding, or worse, when we have used our facility as a source of power over others. But is it possible that something important happens in the use of language that one cannot, strictly speaking, fully understand? Is it possible that not understanding it and being aware of not understanding is also a legitimate expression of faith?

Consider this quote from the contemporary Catholic theologian Karl Rahner: "If God's incomprehensibility does not grip us, in a word, if it does not draw us into superluminous darkness, if it does not call us out of the little house of our homely, close-hugged truths ... we have misunderstood the words of Christianity." (1979, 359) But if the lack of incomprehension is a sign of misunderstanding – then what in the world does understanding look like?

Ohio farmer and author Gene Logsdon (1994) tells a story about a relative of his who was standing motionless on a dock next to a farm pond when a large blue heron came flying in and landed on top of his bare head. Enduring the pain of the bird's talons on his scalp he stood perfectly still but then began to think that no one would ever believe that this had actually happened. Ever so slowly he inched his right hand upward toward his head and then suddenly reached up and grabbed the heron by the legs. His intention was to take the bird back to show his family but the heron struck out at his eyes with its long bill. Fortunately the man was wearing glasses which were knocked off his face. While trying to retrieve the glasses the heron speared his hand with its bill. Skewered, bleeding, and in pain the man decided to let the heron go, figuring that in this case a bird in the bush was better than one in the hand. The heron came unbidden to the man; his attempt to take possession of it was the occasion for his suffering.

Is our attempt to master theological language like this man's vain attempt to take home proof of his sublime encounter? We want to take God home on our terms, enclosed in our conceptual box, to show God off to the family and neighbors. We're not satisfied to come away from the encounter with just a stab wound, a fantastic story and a broken pair of glasses.

Does theology (as the attempt to understand theological discourse) rest on a mistake? Is lacking understanding the problem or is possessing understanding the problem? Are both temptations? Are both legitimate expressions of faith? Can the one be avoided without committing the other?

2.5 The Temptation to Infer Ontology from Grammar

Earlier we noted the temptation to not notice the ignorance in our answers as well as the temptation to turn our questions into answers. Here we look at that situation in a different way. Is the problem that we have asked a question we aren't able to answer? Or is it that we have asked a question that misdirects our attention? Is the fault in the lack of a good answer or is the fault in a misleading question? Perhaps ignorance (not knowing what we're talking about when we talk about God) is not the fundamental problem. The problem may lie in making God the *object* of attention, i. e. making God *the thing we are talking about.* Perhaps God-language is properly

a language we speak *in* when we talk *about* the world and our being human in it. To turn our theoretic attention toward God as the object of attention, then, is to make a mistake.

How do children (or adults) come to know the meaning of a term, like "God," that they never see the referent to? We certainly don't learn it or teach it by ostensive definition, i. e. by pointing and naming. Many philosophers and theologians have maintained that we learn such language by analogy, for example: God/world = self/body, or God/universe = cause/event, or God/all humans = king/nation. There is certainly much to recommend that approach to meaning, but it isn't the explanation I want to investigate here.

When my youngest son was eight years old he announced one day that he no longer believed in God. I asked him why he had come to that conclusion. He said, "Because I've never seen God anywhere." At that point his grandmother interjected, "You think that at eight years old you're a good judge of what there is in the world?" He said, "Do you mean that I just haven't looked in the right places?" She said, "You haven't looked in heaven." I sat silently, grimaced and shook my head. Later I said to my son, "I agree with you more than with your grandma, but I think you're both making a big mistake. Someday I'll try to explain to you the kind of mistake it is." This year he began college. I think it's time.

The assumption my son was making was that God-language functions like a good deal of our language, i.e. by referring to an object and then describing the object. This I will call the referentialist assumption, i.e. that theological language has meaning by referring. One "believes" such language if one thinks there is such a being in the world. My son had ceased to be a believer in that sense. His grandmother had translocated the referent. She, also making the referentialist assumption, saw theological language as referring to a realm beyond the world, to the "supernatural" or to heaven. What I wanted to do was to question the assumption that both were making, that theological language is fundamentally referential.

Ludwig Wittgenstein (1968), in his *Philosophical Investigations*, helps us see that not all meaningful sentences "mean" in the same way and cautioned us against assuming that the meaning of a sentence is displayed by its surface grammar. We may say, "Nothing is better than a fine steak," but it is unlikely that we *mean* what that sentence grammatically *says*. We use the sentence to make a comment about the goodness of steak, not to make a comment about the relative goodness of nothing. Wittgenstein suggested that the meaning of religious language is found in its use, and that it's use can be discovered only by seeing how such language is embedded in the "form of life" of the community of language users. So we come to understand the meaning of theological language not by having someone point us to its referent, but by observing and participating in the forms of life of the

community. If that account is right then my son should have gotten over his referentialism by realizing that the life of the faith community is the source of the meaning of God-language. One understands such language not by finding its referent but by knowing how to appropriately use it, just as one understands time not by being able to locate time as a clear object of thought or experience but by being able to use a clock and make sense of phrases like, "time has run out," "I have time on my hands," and "the clock struck the hour." Part of our understanding such phrases is knowing enough to *not* take them literally. Is that also the key to an understanding of theological language? Do we show such understanding by knowing enough *not* to ask where God is, whether God has eyebrows, whether God's first language was Hebrew, or whether God ever takes a holiday? If that is the case then my son may already know what was wrong with the reasons he gave for his earlier doubt. But the question is, "Why didn't his grandmother also know this?" She was well-immersed in the community of theological language users. Why, in her maturity, had she not overcome what I took to be my son's *immature* referentialism?

I won't try to explore the sources of grandma's understanding of theological language. But I will point out that she is not alone in being a referentialist. Many of religion's fiercest critics are, and they critique religious belief because there is such weak evidence for the belief *in such a thing*. Why do people make the referentialist assumption? The explanation for this is fairly simple (?) – theological language grammatically *looks like* referring language, when we use it we frequently focus our attention raptly on what it refers to, and therefore to argue that we misdirect our attention when we do so attend runs counter to some level of common sense. I understand people's referentialism even when I don't approve of it. It's an easy mistake to make.

I believe, therefore, that any non-referentialist account of theological language must explain both why it is a mistake to understand theological discourse as referential and why it is, at least, so apparently referential. There are many examples of referential grammar paired with non-referential language use, e.g. Lewis Carroll's bit of diabolical dialogue in *Through the Looking Glass*: The messenger says, "I'm sure nobody walks faster than I do," to which the white king replies, "that can't be, otherwise he would have been here before you." Alice says, "I see nobody on the road." to which the king replies, "I only wish I had such eyes. To be able to see Nobody, and at that distance too." (1982, 194, 192) When we innocently say, "It is raining," we do not refer to some thing or agent, "it," that is doing the raining. Only a Martian trying to learn our language (or a philosopher or theologian?) would ever suppose that the sentence did so refer. But many do commonly suppose that "the Lord leads me in paths of righteousness" does refer to God and what God does. In the latter case the referentialist

reading may turn out to be a mistake but it is not a stupid or comic mistake in the same way that the former examples are.

The philosophically interesting question is why we should have a "systematically misleading" language where the grammar (if taken seriously) is a mismatch for the ontology (if taken seriously)? What we want to say, I believe, is that God is manifest in the world without being an object, a being, in the world. We want to make sense of the appropriateness of the Psalmist's "The earth is the Lord's and the fullness thereof" (Ps 24:1) at the same time that we see the inappropriateness of the theistic arguments over the *existence* of God, as though God were some thing that might or might not exist.

Perhaps the clearest thing to say is that the inappropriateness lies in the question "Does God exist or not exist?" as well as in our willingness to settle for one of the traditional answers. If the referentialist assumption is challenged, the question tends to dissolve rather than be answered. Perhaps this is also the point of many teachings in the Buddhist tradition. A questioner will ask, "Is Nirvana a something or a nothing?" The response challenges the assumption embedded in the question. Something similar occurred in the sciences with the question about what is the center of the cosmos, "Is your view geo-centric or helio-centric?" Eventually the question disappeared when the relativity of "center" was realized and the silliness of the earlier debate became apparent.

Is there a certain kind of usefulness to the referentialist grammar of God-language? Should we go on speaking about God, God's characteristics and actions, as though God were some person-object in the world? How do we explain why we would not be better off without such systematically misleading language? Does theology (as referential words *about* God) rest on a mistake?

3 A Reflection about These Temptations

It is an appropriate point to take stock and ask again the general question about theology: does theology rest on a mistake? Recall the characterizations of theology in the questions posed at the end of each temptation:

Does theology …
(as a fundamental, i.e. first or last, word)
(as a language of transcendent authority)
(as a claim to know something about God)
(as a claim to have answered a question, and advanced our understanding)
(as the attempt to *understand* religious language)
(as words *about* God)
… rest on a mistake?

Do these characterizations exhaust the domain of theology? Is there something else that theology might be than the claims and activities and attitudes delineated here?

The first draft I wrote of this essay listed what I have here called "temptations" as "fallacies." But then I realized that it doesn't make sense to list as fallacies patterns of thinking that one can't avoid doing. It makes sense to call something a logical fallacy only if it is avoidable. But are these theological temptations avoidable? The fact that they may not be avoidable is the reason that I stated some of them the way I did. I didn't cite using transcendence as a source of authority and power as a fallacy; the fallacy is *not noticing* that one is so using it. The fallacy is not giving names to our ignorance. The fallacy is *not noticing* that we have done so. Consequently these may be mistakes that we will unavoidably make whenever we succumb to the temptation to speak theologically. Recognizing them as temptations (rather than fallacies) orients us to the domain of discourse differently. I don't believe it silences the discourse. It expands it.

4 God-Language Constructs a World and a Human to Inhabit It

4.1 Pursuing a Suggestion from Kushner

I would like to offer some suggestions toward a positive understanding of the way God-language works. The first employs a provocative suggestion from the Jewish writer Harold Kushner: "Religion is not primarily a something to be believed ... . Religion is first and foremost a way of seeing." (1989, 27). Where does this lead?

An architect must see a building and make a drawing of it from a point of view that is not (strictly speaking) experiencable. Where would one have to stand in order to experience the view one "sees" when looking at a floor plan of a building? In a place no one ever gets to. Yet such imagining/seeing informs the way an architect sees every building he/she enters. An astronomer shows us our place in the solar system or in the galaxy or in this galactic cluster, but each time does so from a point of view completely outside the realm of human experience. We'd have to be an immense distance from the sun to experience the solar system as the astronomer draws it. Yet we are used to floor plans, sections, the picture of the solar system, etc. Most people can make the move of the imagination necessary to relate the floor plan to the building they are walking through (although I know young children can't do this) and relate a map to the terrain they are traveling (although I have met some adults who couldn't).

Similarly an historian can bring us to have a perspective on the events of the present by presenting us with an account of our past. Historical (or

storied) seeing, like the seeing of the architect or the astronomer, lets us navigate the present from a perspective outside it. If the present is chapter twelve in a story we see its events differently than if we had no historical perspective at all. Controlling that story influences the interpretation, and the interpretation influences how we see contemporary events, and this seeing influences decisions we will make as we take part in them. Our living becomes story-informed. This too is a way of seeing. All of these examples (architect, astronomer, historian, storyteller, etc.) require the employment of imagination to move ourselves to a point of vision (a way of seeing) that transcends our own limited experience. From there we see the world (and perhaps ourselves in the world) by means of the transcendent viewpoint.

When I read the Genesis creation narratives I may either focus on the details of the story being told (How long does it take? How long were the days? In what order are things done? How long ago did this take place? Is the god of this narrative more likely to be male or female? Why does he/she create by speaking and by separating? Is God some kind of neat-freak, as was suggested by one of my students, such that everything's got to be in its proper place, reproducing "according to its kind"?) Such questions suggest I am reading the text as a "something to be believed."

On the other hand I may read the story to focus on the way the world and we human creatures look from that point of view. Is the story primarily about God and the pattern of creation or is it primarily about how humans are in relation to the world? In the former case the focus is on God's agency and the sequence and detail of the events. In the latter case I come to see (1) the goodness of creation, (2) that it belongs to God, not to humans, (3) that we are gifted creatures (4) able to talk to God – i.e. we are response-able, (5) given a particular vocation – stewardship, (6) to recognize and observe limits, (7) but we are inclined to be rebellious, to take over, to assert mastery rather than the appropriate stewardship, etc. To return to Kushner's point, there is a way to read the story as *a something to be believed*, but there is also a way to read it *as a way of seeing* one's self and the world. One may read it as *an informing story* or as *an orienting story*. One can focus one's attention on the story or one can focus one's attention on the world by means of the story. If one does the former the focal question quite naturally arises, "Do we believe this?" If one does the latter the focal question becomes, "What can one discover by means of such seeing?"

We live in a constructed world. The world is constructed by the languages we speak, by the concepts we use, by the stories we tell, by the institutions and cultures we live in the midst of.

Religions are among the constructs we use to make sense of and find our way in the world. Religions may see the world in diametrically opposing ways. Gandhi's contemporaries tended to view the world in a chauvinistic way, as basically a Hindu-Muslim, "us-them" world. To be a Hindu meant

to be fiercely opposed to "them," the Muslims, and to be a Muslim meant to be fiercely opposed to "them," the Hindus. Into this constructed world comes Gandhi, respected by both Hindus and Muslims because of the heroic way he took on the colonial British. But once the British were gone, Gandhi said, "I am a Hindu and a Muslim and a Sikh and a Christian..." and "We are all children of the same God, brothers and sisters to each other in His eyes." So there isn't such a thing as *the* religiously constructed world, but many religiously constructed worlds. So probably the most important questions one can ask about any religion or sect within a religion is what kind of world does it imagine, what kind of human does it construct? What are we hereby empowered to see?

I am reminded of this conversation in Sally Vicker's novel, *Miss Garnet's Angel*:

> Tobias: "Azarius, ... you told me once I may find out who or what you worshipped when we got to Ecbatana. Might you tell me now?"
> Azarius [who we later discover is also the archangel Raphael]: "How would courage and truth and mercy and right action strike you?"
> Tobias: "But those are not gods!"
> Azarius: "Tobias, for heaven's sake, what do you think a god looks like when he works in men?" (2001, 327f).

It isn't only religions that construct a world in this way. I would venture that academic disciplines may do so as well. Economics constructs a world, a world some people try to live inside. The mechanistic science of the Enlightenment constructed such a world, a world some people are still trying to live inside of. One may read the philosophy of David Hume as the earnest struggle to live inside such a world and discovering that it was too small even to practice the science of his day.

4.2 Following a Way of Thinking Modeled by Heidegger

Martin Heidegger (1971) wrote an essay titled, "Poetically Man Dwells," based on a line from a poem by the Romantic German poet Friedrich Hölderlin, "Poetically man dwells in the world." Heidegger explored both the poetical man and the idea of dwelling. Suppose we were to pursue the same kind of project only substituting some terms. What would it mean to say:

> "Answerably humans speak in the world"?
> "Caringly humans gather in the world"?
> "Mindfully humans savour the world"?
> "Giftedly humans share the world?"
> "Openly humans question the world"?
> "Gratefully humans celebrate the world"?
> "Responsibly humans steward the world"?

"Forgiven, humans embrace each other"?
"Fragile yet hopeful, humans greet another day"?
"Reflecting God's love, humans serve the deep needs of the world"?

I think you get the picture. In each case, what kind of faith, what way of seeing, enables and empowers the becoming of such persons and such worlds? God is manifest in the way the world is worlded (and the way it is not) and the way the self is selfed (and is not).

4.3 Martin Buber's Warnings about the Temptation of Theology

Many of the concerns that I have raised in this essay were more eloquently stated in the third part of Martin Buber's *Ich und Du*, first published in 1923. I quote here from my own translation of his text:

> I do not believe in God's naming or defining himself before humans. The word of revelation is: I am there as whoever I am there.
>
> By its very nature the eternal You cannot become an It; because by its very nature the eternal You cannot be placed within measure and limit, not even the measure of the immeasurable or the limit of the unlimited … . And yet we reduce the eternal You ever again to an It, to a something, to a thing, as is our nature.
>
> The meeting with God does not come to a person in order that he or she may thereafter be preoccupied with God, but in order to demonstrate the meaning of the encounter in action in the world. All revelation is calling and sending. But again and again a person avoids action and turns back to focus on the revealer. This person would rather focus on God than face the world. But when he turns back [toward God] he is no longer met by a You. Instead he encounters an It-God, and talks on and on … . Just as an ego-maniac does not feel or perceive anything directly but mediates everything by the I that perceives or feels … so the theo-maniac (who gets along well with the ego-maniac in the same soul) will not put the gift into action but focuses exclusively on the giver and consequently misses the meaning of both. (1923, 129, 132f).

5 A Word about "Transcendent" and "Transcendence"

Before I draw conclusions, a word should be said about the uses of the terms transcendent/transcendence. Some people suppose that talk about transcendence is talk about the super-natural. This is not the way I want to use the term. Something is transcendent if it goes beyond ourselves, for example if it calls us or demands something from us, or lures us on to a new level of seeing, understanding, or being. There's a hymn that's occasionally sung in the church I attend. It's based on Psalm 23 and its chorus goes, "Shepherd me, O God, beyond my wants, beyond my fears, from death into life." It's easy to understand a prayer to fulfill my wants or to avoid

my fears. But how can I pray to move beyond my wants and beyond my fears? That's transcendence, when something that does not spring from my own wants and fears captures me and stretches me beyond such things, perhaps even beyond my imagining. Such an encounter can be the occasion of my growth, my conversion, my death and rebirth, my arrival as a new person. A work of art can do that. A story can do that. An encounter with a person can do that. God can do that. In fact, I'm tempted to say that God by definition does that. A god that serves only my own wants and fears is an idol after all.

George Steiner, in his book *Real Presences*, uses the word transcendence in this way. He writes:

> This study will contend that the wager on the meaning of meaning, on the potential of insight and response when one human voice addresses another, when we come face to face with the text and work of art or music, which is to say when we encounter the *other* in its condition of freedom, is a wager on transcendence. (1989, 4)

I might be accused of playing with the vagueness of transcendence here. That certainly could occur, particularly if I were to fall into the temptation of constructing a kind of ontological argument, "transcendence occurs therefore the transcendent exists." But that is one of the mistakes I warned against above. Part of the interest of transcendence depends on its vagueness. So I'm not so sure we should avoid such language even if we were able to do so.

6 *Conclusions*

1. Theological discourse is an attempt to say something significant in a language we do not completely understand. Like straight lines drawn through a circle theological language has points of intersection with ordinary language but then moves on again. If we miss the points of intersection we do not understand the language at all. If we see only the points of intersection we do not understand it either.

2. This not-understanding is not a condition we can avoid (I'm not even sure it's a condition we ought to lament) but it should be a condition we are aware of. It has been the main point of this chapter to increase that awareness.

3. God-language is life – constructive, i.e. it's a language primarily used to construct a world and a human to live in it, but it's a problematic language if one uses it to focus on God. If theology is primarily attention to God as thought-object it is a mistake. I would assert this in spite of the fact that the Greek roots of "theology" imply that it entails discourse (*logos*) about God (*theos*).

4. We should avoid mistakes when we can, but when we can't we should learn from them. As I frequently remind my students, there is no bad question if it's a question you genuinely have. But of course that's not completely true. Sometimes a question can be bad because it's misleading. The question, not its answer, may lead us off in the wrong direction. Some questions have been misleading us for centuries. But sometimes asking the bad question is the best question that can be asked (if we're willing to learn from it).

5. Theology must be a dialogue between understanding and skepticism. We lose something significant if either of these voices is silenced. Theology is an understanding that does not comprehend, a confessed ignorance that reaches beyond itself, a suspiciousness surprised by its own grounding in care for truth and goodness.

6. One should use theological discourse only if one is willing to be a perpetual learner, a constant inquirer, a person with more questions than answers, aware of the fact that the answers one has are often, in fact, new questions, and the questions are sometimes misleading. Nicholas Lash has written:

> I would go so far as to say that the great religious traditions are best understood as schools, contexts of education, the participants in which help each other thus to worship, while yet not worshiping any thing: not the world; not any constituent fact or feature of the world; nor any individual or ideal; nor any nation, dream, event or memory. (2004, 11).

7 The Oddest Word: Coda

Ludwig Wittgenstein ends his *Tractatus* with the infamous injunction: "Whereof one cannot speak clearly, thereon one must remain silent." I (and he, later?) would have preferred this imagined Buddhist revision: "Whereof one cannot speak clearly, thereof one must speak mindfully."

I think we would agree that about God, about the ultimate transcendent (another, but not a better name for our ignorance), that neither the last word nor the wholly appropriate first word can be said. The words we speak about the transcendent are always amendments and/or deconstructions, attempts to say what we should have said to begin with but couldn't find the fitting word or the fitting thought. Many times we proceed toward both simultaneously. When I write I frequently find that I cannot help but writing parenthetically (you may have noticed), commenting on the previous sentence and earnestly attempting to correct misunderstandings the reader and the writer may have had.

So, about God, the ultimate transcendent, can anything be said? In one sense the answer is obvious, because a great deal has been said. Can things

be said clearly, unequivocally? I think the answer is truthfully "No." This is why I believe that dialogue may be the best form for theological and philosophical discourse. Think of Dostoevsky's *Brothers Karamazov*. Who is the profound theologian there? The pious Alyosha or the skeptical Ivan? My answer (and Dostoevsky's?) is, both together. Think of Plato's *Symposium*. Not even Socrates can speak the whole truth there. He needs Diotima and Alcibiades and Plato to say everything that needs be said. Or think of a volume like the present one that engages Christians, Buddhists, and members of the scientific community in an attempt to speak to and learn from each other.

Should we, then, theologically remain silent? I think the best answer is, "Probably more than we do." When we do speak we must speak mindfully, aware of the temptations and the errors we're prone to make and aware of the temptations involved in trying to avoid them. In speaking about such things we need perhaps to speak an intentionally impaired language, e.g. a word without vowels that cannot be uttered or a word with a deliberately warped grammar (like Lewis Carroll's), or a word that comes with a warning label (like that offered in the Tao te Ching) that the word we speak is not the word we needed to say, and that it is certainly not the last word.

Yet we, as learners and teachers, again and again try to speak the helpful word. (That's not a bad definition of teaching, the attempt to speak the helpful word.) So I hope that at least some of these words have been helpful.

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Chapter 10
Limits of Scientific Knowledge

John R. Albright

1 Summary

After examining the question of what is meant by "scientific," the question of reality is examined. A position of critical realism is assumed. Laws of nature are examined to see the ubiquity of time-dependence, as well as the constancy of certain numbers, certain invariant quantities (energy, momentum, etc.), and the form of the laws themselves. Limits of knowledge are examined in the light of quantum mechanics and chaos theory. Although detailed knowledge may not be available, probability and statistics can provide useful information on the average. A variety of metaphysical battles – both past and present – are presented with a view toward possible resolution of metaphysical questions.

2 Introduction

It is the purpose of this essay is to ask what science can know, and how certain can we be of the answers. To explore the limits of scientific knowledge, we need to examine statements that are clearly not scientific, those that clearly are, and see what are the differences. We can also look at statements that are now ambiguous in this regard, but which one day may be clarified.

To start, we need to have agreement on what is science. The word "science" comes from the Latin *scientia*, which means knowing or knowledge. In English the meaning is somewhat more restrictive, and I shall take the attitude of Karl Popper (1963, 33): a statement is scientific if it is in principle capable of being proved false. As we shall see, a statement can be unscientific and still be meaningful, but we will have trouble determining whether the statement is true or false.

It has long been understood that there are two basic ways to learn things: induction and deduction. Induction is the process of learning from experiment or observation. Deduction is the process of learning from logic and theoretical reasoning. Both of these have their problems. Induction can clearly be fallible; the classic example is the ornithologist who observes hundreds of

swans and reaches the (scientific) conclusion that all swans are white. Then one day the ornithologist goes to Australia and observes a black swan, and thereby falsifies the earlier conclusion. Deduction has the problem that no essentially new information is added to one's knowledge. The process of deduction uses mathematics and thereby has a reputation for reliability; so we turn first to a consideration of mathematical knowledge.

3 *Mathematics*

A mathematical system is a logical structure based on primitives, axioms, postulates, and the statements that follow deductively from these. Primitives are concepts that we agree do not need to be defined. Axioms and postulates can be added, taken away, or otherwise modified to produce different structures. None of this implies any connection to the real world. Thus Bertrand Russell said, "Mathematics may be defined as the subject in which we neither know what we are talking about, nor whether what we are saying is true." (cited in Newman: 1956, 4). Russell and Alfred North Whitehead set out to show rigorously how mathematics could form a complete and consistent edifice. They were unable to attain their goal, and Kurt Gödel proved that the task is impossible. A mathematical system cannot be both complete and self-consistent. There will always be propositions that cannot be proved either true or false within a self-consistent mathematical system (Hofstadter: 1980).

4 *Science and Reality*

Consideration of the foundations of science leads to the question of reality, whether what we perceive around us is real or just an illusion (Needham: 1955). The problem is quite old, appearing already in Plato's allegory of the cave (*The Republic*, Book VII). A group of humans lie tied up in a cave where they can see one wall ahead of them, but nothing behind them. They can see shadow-like figures moving around on the wall, but they do not know whether these are real, or whether they are shadows of real people who are moving around in the opening of the cave behind their heads. They can have lively discussions about the nature of reality, but – short of being untied – they cannot check out their theories of reality.

After all these centuries, people are still arguing whether or not we perceive reality. How do we know that we are not just part of an exquisitely designed computer simulation? We don't know. There is no experiment we can perform that will tell us the answer. Therefore statements such as "what we perceive is real" or "what we perceive is unreal" are not scientific statements. They are metaphysical, that is, they are beyond science.

Do scientists ever make metaphysical statements? Of course they do! Any scientist who says, "I never make metaphysical statements," has just made one. A scientist has the right to lay metaphysical foundations, establish primitives, axioms, postulates, subsidiary assumptions, etc., and follow them to see where they lead. It is perfectly agreeable to make metaphysical statements as long as they are carefully identified as such. Sometimes a scientist may figure out a way to test the truth of a metaphysical statement, in which case it becomes a scientific statement, even if the test has not yet been performed.

Two examples of statements that are very likely to cause confusion and irritation: (1) a metaphysical statement is put forward as scientifically true, when in fact it has not been established, nor is there any reasonable proposal for testing the statement, and (2) an unspoken metaphysical assumption underlies a scientific statement. In the latter case, a change in the metaphysical foundation can lead to new and improved understanding. This is what happened when Einstein's special theory of relativity was proposed. The metaphysical assumptions of absolute space and time along with a variable speed of light were replaced with the opposite metaphysical assumption. The resulting theory was in disagreement with Newton's mechanics, and led to testable results, causing these notions of space and time to be scientific.

Most scientific thinkers in recent centuries have used some form of critical realism as a metaphysical foundation for their work. In the remainder of this essay I shall assume (a metaphysical assertion) that we are part of a real universe. Realism as a starting point for science is often questioned, even attacked. But it has been a fertile choice for science itself and for its associated technology. The fact that much technology works and is useful is of course not a proof of the correctness of realism at the base of science, although it is too often seen as such by practical-minded people.

I further assume that it is the task of scientists to figure out how the universe really works. The motivation to learn more about the universe and how it works could be regarded as mere curiosity. I consider that for very many scientists it is much stronger: they behave as if they were called by God to find out more about how nature works. They act this way even though they may have serious doubts whether God exists. Notions of calling or vocation have often been limited to professionals in religion. In Lutheran Christianity the idea is much more inclusive. Lay people, including professional scientists, can have a calling (Wingren: 1957, 172; Luther: 1962, 100).

5 *What Science Has Learned*

Scientists have gathered a great deal of information in recent centuries, and they produced a corpus of theory that has done a remarkably good job of representing the data. The data served the process of inductive infer-

ence so as to suggest theoretical structures, and the theorists reasoned from foundational assumptions to develop mathematical structures that exhibit both economy and beauty in their description of the phenomena. These are called laws of nature.

Science has learned that there are laws of nature, of which I name some examples; the list is not complete by any means:

- Newton's laws of classical mechanics
- Maxwell's equations of electricity, magnetism, and light, along with Einstein's special theory of relativity
- Einstein's general theory of relativity
- Quantum mechanics, with the dynamics represented by the Schrödinger equation and the Dirac equation, as well as the principles of quantum field theory (Sudbery: 1986)

There are likely to be other laws of nature that, when they are discovered, will make these seem rather simple. Some aspects of these existing laws are inconsistent. For example, general relativity is nonlinear and it admits perfectly determined points; therefore it is incompatible with quantum mechanics, which is linear and which does not permit perfect determination of points in a space where both position and momentum are to be specified.

The laws of nature operate according to mathematical principles. It was thought during the latter part of the nineteenth century that all the laws of nature could be expressed in the form of partial differential equations. More recent work has showed that additional types of mathematical structures are needed to understand nature. To illustrate, consider general relativity, Albert Einstein's theory of gravity. Mathematics, as Einstein knew it, was inadequate for the task of describing a space warped by the gravitation of massive objects. So Einstein "discovered" an already known branch of mathematics, tensor calculus, and used it for his purposes.

Another example is the development of quantum mechanics, begun by Werner Heisenberg in 1925 – not with second-order partial differential equations, but with matrix algebra. Paul Dirac soon showed that an even more general mathematical structure is the true framework for quantum mechanics, viz. a noncommutative algebra for linear operators in Hilbert space (a space in which vectors can have a scalar product and in which they can be projected onto each other). In 1926, Erwin Schrödinger introduced a wave equation (named for him) and the wave function, *psi*. The Schrödinger equation is a second-order partial differential equation; it was immediately attractive to physicists who had been taught to believe that such equations were necessary for understanding. They also knew how to solve such equations, since the same sort of thing comes up in heat flow, fluid dynamics, and classical optics. Before the end of 1926 several physicists had showed that the Schrödinger theory is subsumed into Hilbert space, and that to understand the spin of electrons requires mathematics that is part of Hilbert

space, but not involving partial differential equations. Quantum mechanics is just one example of how newer types of mathematics have arisen to supplement (not to replace) those of the past.

The ubiquity of mathematics has long been a source of awe and wonder on the part of scientists. Why should mathematics be able to do all the things that it does? I hold that the ubiquity can arise from several sources:

1. Perhaps it is just a coincidence.
2. Perhaps a higher power made things to run that way.
3. Perhaps scientists are conditioned to look only for the easy solutions to their problems, and to use the mathematics that they learned in their early days.
4. Perhaps we are forever widening our definitions of mathematics to include whatever structures we need in science.

The laws of nature as listed here all have the property that they are close to unintelligible if you do not included dependence on time. The most cogent example of this comes from the history of the development of Maxwell's equations. At the beginning of the nineteenth century there were three separate subjects: electricity, magnetism, and optics. The first two of these had been studied mainly for static systems, in which the strength of the forces do not change, and none of the components of an experiment are in motion. A sequence of brilliant experiments and sharp insights by such scientists as Hans Christian Oersted, Michael Faraday, and Joseph Henry led to the possibility of James Clerk Maxwell's synthesis with a crucial extra term in the equations that connected the time change of an electric field with the appearance of magnetic effects. As a bonus, Maxwell's completed equations contain the theoretical resources needed to understand classical optics. The conclusion is that the proper inclusion of time-dependence is essential to fuller understanding.

There is more to the story. In 1905 Albert Einstein presented his special theory of relativity, in which one of the most important features is the assumption that space and time should be treated on an equal footing. This assumption was for a number of years too metaphysical for the taste of some people, but its use as a foundation of relativity (both special and general) has led to testable consequences, and so the notion of a four-dimensional space-time continuum has become an integral part of scientific knowledge.

Although the case has just been made for thoroughgoing use of time in scientific work, it is also true that already in the eighteenth century it was noticed that certain quantities do not change in time, even when everything else is changing. Matter is conserved in chemical reactions, once you take into account all of the input and output quantities of the reaction. In the nineteenth century Count Rumford and James Prescott Joule found that energy is also conserved, once you realize that heat is just another form of energy.

What does science know about things that do not change in time – or space, as relativity reminds us? Most importantly, the laws of nature are seen as unchanging. This is a metaphysical assumption that has been built into most science since the Enlightenment. It was one of Isaac Newton's great contributions to assume that gravity in astronomy – sun, moon, earth, and planets – is the same as for falling objects locally on earth. The assumption about gravity is no longer considered metaphysical, since it can be tested, and it has passed all the tests so far. A different test of the universality of the laws of nature comes from studying "old light" emitted from faraway galaxies. Because of their great distance from us, the light must have been emitted a long time ago. By studying the spectral intensities of such light we can figure out whether atoms that long ago followed the same laws as are obeyed by atoms here and now. The remarkable fact is how little things have changed.

We have already seen that certain specific quantities do not change in time, even when most other things are varying. The conservation of matter and energy has been mentioned above. In addition there are laws about conservation of momentum and angular momentum. There are also more esoteric principles of symmetry that give rise to other conservation principles; for example, the invariance of electromagnetic fields under a gauge transformation implies the conservation of electric charge. It was the great contribution of Emmy Noether to realize that symmetry in the description of a system in physics implies a conservation law.

One example of how scientists can be misled by assuming invariance in space and time is that of the cosmological principle of astronomy. The cosmological principle holds that the universe should look approximately the same from any point in space and viewed in any direction. This was a metaphysical principle based in part on the notion that humans are not so very special that we should be at the center of everything. The perfect cosmological principle is the same statement but including time. On the basis of these metaphysical beliefs, it was also believed that the universe is static when considered as a whole. Einstein's equations of general relativity, when set up to describe a spherical universe, do not have a static solution. So Einstein added an extra term to the equations to allow for the possibility of stasis and hence satisfaction of both cosmological principles. He later claimed this action was his worst professional mistake.

An additional type of entity that persists in our description of nature is the quality of goodness in a scientific theory. We are speaking here of beauty, subtlety, and elegance. These are attributes that are close to impossible to define, but which seem to belong to the best of theories. Symmetry and invariance are examples of attributes of great beauty; yet is would be wrong to insist on them as indispensable to a correct view of nature, since symmetries are sometimes broken by nature. Subrahmanyan Chandrasekhar

(1987) and Paul Dirac were both fond of saying that beauty is the most important property that a theory can have. It is like saying that God would not make the universe to run according to ugly theories.

6 *What Can We Know?*

Before examining what we can know, I wish to confront an accusation frequently made that scientists really do not know anything, since theories are just assumptions, and experimental results are all too theory-laden for anyone to take them seriously. Part of the trouble with such an attitude is that the role of theory is misrepresented. A guess (let us hope it is a shrewd one) is a hypothesis, put forward for refutation or partial corroboration. A theory is a concatenation of hypotheses, many of which have passed numerous tests that enable efficient examination of observational data. It is true that much of the time the data are theory-laden, that is, they are interpreted in the light of existing theories. It is part of the task of being a scientist to know the theoretical structures from the ground up, so as to understand the limits of the theory and thus avoid misusing theory in the analysis of data. Inevitably, mistakes will be made, and incorrect conclusions can result from perfectly honest data that were misinterpreted because of the use of the wrong theory (or the correct one, wrongly applied). It often happens that bad scientific statements get made about good measurements because the quantities measured were not what people claimed. Such cases usually get sorted out in the fullness of time, and science muddles its way to an approximation of correct knowledge.

It was believed long ago that the most useful kind of knowledge would be the ability to predict the future. This would be possible only if nature is deterministic; and the simplest sort of motions in nature appears to be deterministic. The evolution of primates was helped by the realization of determinism in nature, since a monkey wants to be able to predict its motion after jumping from a tree branch; if the monkey cannot predict ahead of time where its body will go through the air, the result may be a very painful fall to the ground. Prediction of the future positions of planets in astronomy was useful for such reasons as planting crops at the most appropriate time. It was noticed early and systematized by Ptolemy that the planetary motions were in fact predictable, even if their motion was incorrectly understood. Successive improvements in understanding came from Kepler, Galileo, Descartes, Newton, and Laplace; the outcome was to convince scientists that determinism is a law of nature. Unfortunately for this point of view, it is not a law of nature. Atomic-sized systems do not work within a framework of strict determinism, as quantum mechanics makes clear. Even worse, the result of chaos theory is that large percentages of

systems, which obey Newton's laws and are too large for quantum mechanics to be important, are subject to the results of chaos theory, in which no practical vestige of determinism remains.

Quantum mechanics talks about the uncertainty or the lack of precision in measurements on atomic-sized systems. But anyone who has tried to perform experiments is painfully aware that measurements are always somewhat imprecise. The immediate reaction is that if you want to improve the precision, then you simply spend the money to purchase better equipment and thereby improve the quality of your knowledge. However, the uncertainty of quantum mechanics is of an ontological nature, and there are limits beyond which you cannot push the quality of measurement no matter how much money is in your research budget.

If the uncertainty is inescapable, does this imply the end of epistemology? Can we know anything at all? The answer is that we can know some things. There are two general categories in which we can know quite a lot. First, in quantum mechanics some measurable quantities can still be very precise. An important example arises from lasers, where the frequency of the light emitted can be measured to extreme accuracy. Secondly, quantities that are imprecise can still be treated statistically.

7 *Probability and Statistics*

The determinism and predictability of Newtonian mechanics hinges on the initial knowledge of position and momentum of particles at an instant in time, from which one then calculates the subsequent motion to the required accuracy. However, quantum mechanics, through the uncertainty principle, denies the possibility of getting enough accuracy for both position and momentum at the same time. Yet we observe Newton's laws at work to an accuracy that is sufficient for human-sized applications, even though that accuracy is not good enough for atomic-sized systems. How can this be? The answer comes from statistics. Human-sized systems are composed of impressively large numbers of atoms and molecules, so that a lot of averaging occurs. As a result, we appear to have the ability to measure position and momentum simultaneously. We do not need to track every molecule to get predictability at the human scale.

An important analogous case is the probability and statistics of insurance. A life insurance company does not know when any specific individual will die, yet the company knows with statistically great accuracy how many members of a given age cohort will die in a given year.

The use of probabilistic arguments to describe the bulk behavior of collections of atoms and molecules is not exactly new. It was pioneered by James Clark Maxwell and greatly advanced by Ludwig Boltzmann and Jo-

siah Willard Gibbs. Nevertheless, Albert Einstein – who contributed to this formalism in his classic study of Brownian motion and his remarkably fertile derivation of Planck's radiation formula – never liked the notion of using probability in physics. He disliked the uncertainty principle, claiming that no theoretical system that relied on probabilities could possibly be complete, and that the Old One (God) would never have created such an ugly situation. Most physicists of our time do not share his distaste for probability and statistics.

One reason for the dislike of probabilistic notions on the part of older generations was that they saw it as a loss of the precision of logic that you get from good old mathematics. There was something elegant about being able to draw seamless, watertight conclusions from starting points that are totally accurate – in principle. Since such starting points are now seen to be rare, what is needed is a different form of mathematics that can handle uncertain starting points. The mathematical structure has in fact been built; it is called fuzzy logic (McNeill and Freiberger: 1993). In ordinary logic, a proposition is either true or false, and direct reasoning allows one to draw sure conclusions from this process. Fuzzy logic recognizes that true-or-false is not the only possible response to many – perhaps most – statements that you can make. Basically, it can work with statements that are half true and half false; or it can deal with statements that are probably true with a certain degree of probability. Alfred North Whitehead – a great logician as well as a process thinker – expressed the situation: "There are no whole truths; all truths are half-truths. It is trying to treat them as whole truths that plays the devil." (1954, 16).

8 Metaphysical Battles, Past and Present

Earlier we noted that there is a metaphysical battle still in progress between realism and its denial. This is only one example of many metaphysical battles. Some of them have been fought and won by a particular side; in this case we say that the situation has become one of a scientific choice, and definitive experiment(s) led to a decision. In other cases the struggle is still going on, and it may remain metaphysical, at least for the near-term future. So partially as outlines of possible future work, I list here in no special order a number of titanic battles that are of interest to me.

8.1 Realism vs. antirealism was considered above (Norris: 2000). In its rawest historical terms, it was described by James Boswell in his *Life of Samuel Johnson*. Dr Johnson explicitly rejected Bishop George Berkeley's (1965) antirealist position by kicking a large rock and saying, "I reject it thus!" (Boswell: 1952, 134, 450).

8.2 Does the universe (or any part of it) exhibit progress, stasis, or cyclic behavior? Religions have argued much about this question. In general the Abrahamic religions favor at least a universe that has a beginning and an end, perhaps leaving open the question of whether there is progress in the time between. Other religions take different points of view. Cosmology is only a rather recent science, but it has become respectable since World War II. This issue has been fought among cosmologists, professional and amateur. The current state of belief among most scientists is that the universe had a beginning (the Big Bang). It will have some sort of end, although we cannot rule out that a future collapse (the Big Crunch) could lead to a rebound and thereafter a cyclical universe. Notice that this attitude entails a rejection of the cosmological principle. Before the 1960s some version of a steady-state universe was the favorite of a large segment of scientists – in some cases it was for religious reasons; they thought that the Big Bang resembled too closely the Judæo-Christian scriptures. The discovery of the microwave background at a temperature of a few kelvins (near absolute zero) led to nearly universal rejection of the steady-state universe.

8.3 Is nature discrete or continuous? From the time of Newton until the 1920s this question was asked concerning whatever entities were known. The ancient Greeks had speculated about this, but had no means of coming up with an answer. Light, matter, electricity, and other things were investigated during the nineteenth and early twentieth centuries. The results led mostly in paradoxical directions. Quantum mechanics provides an answer, and it is that the wrong question was being asked. The dichotomy between discrete particles and continuous waves has become a duality in which waves are quantized and particles have continuous wave functions.

8.4 Do causal forces proceed from contact or from action at a distance? In fancier words, do we have contiguity or telekinesis? This problem bothered Isaac Newton a great deal. For want of a better description, he considered gravity as acting at a distance, keeping the earth and the other planets in orbit and causing apples to fall; but he was unhappy with this choice. David Hume stated that contiguity is an essential requisite for causality, in spite of the fact that Newton's law of gravity had been around for more than a century. Michael Faraday gave us an answer to the question that still serves scientists in a practical way. Object A sets up a force field that fills all of space; that field interacts locally with object B, exerting a force on it. At the same time, object B sets up its own force field that interacts with particle A, with a force that is equal and opposite to the force of A on B. Thus Newton's third law is preserved. The theory of fields has enjoyed spectacular success for electromagnetism and it works for other forces as

well. It has come to the point where theorists hardly know how to set up a theory without the field concept.

8.5 Is nature deterministic or random? This question was discussed above. The conclusion of our time is that we need not expect determinism. A minority of physicists still dislikes the use of statistics and yearns for a theory that can preserve determinism. Theories of this type are called "hidden-variable" theories. In competition against quantum mechanics, they are more complicated and still do not explain all the observed phenomena.

8.6 A metaphysical dichotomy that is not often discussed in public is the question of local vs. global theories. Local theories (such as Newton's laws, Maxwell's equations, Einstein's equations in general relativity, the Schrödinger equation, and the Dirac equation) are built using differential equations that are valid for each point in space-time, without regard for nearby points, or the history of the system. These theories have been outstandingly successful at describing nature – at least in its simpler aspects. Global theories (such as the second law of thermodynamics, Feynman's formulation of quantum mechanics, or the principle of least action) typically proceed by considering two different points in space-time, conceptualizing all possible pathways between them, and calculating a quantity (often called the action) for each path. The system will then proceed according to the path that extremizes (maximizes or minimizes) this quantity (Doughty: 1990). This type of theory is called global because it relies on every point in space-time, not just one point. Global theories have been around since the seventeenth century, but only in the twentieth century has their pervasiveness come to be realized. Most of the time, the global theory implies the local one. But it contains more information, and it is not in general easy (or even possible) to go the other way, to derive the global theory from the local one. There has been a tendency for global theories to be expressed in terms of teleology, as if the system seeks the lowest value of the action-like quantity. Enlightenment thinking, led by Voltaire, resoundingly rejected any such statement as being medieval (water seeks its level, etc.). The attack in our day often takes the form of accusation of being non-scientific. The rejoinder is to ask whether the opponents really think the second law of thermodynamics (a closed system acts so as to maximize the entropy) is unscientific. The teleological aspect of global theories is sometimes softened by reference to teleonomy, by which one means that a system acts as if it were seeking a goal (*telos* in Greek), but we know better: the system is inanimate and therefore incapable of having a goal at all, let alone seeking it.

8.7 Examples thus far have mainly come from physical science. Metaphysical dichotomies can happen in other sciences as well. In geoscience there is

the question of the everlasting hills vs. plate tectonics. In spite of long and well-established notions of the permanence of large continental features, the case is now quite strong in favor of the time-dependence associated with plate tectonics and continental drift. Not only do the eastern shores of the Americas fit well with the western shores of Europe and Africa on a map of the Atlantic, but the fit improves when you use the continental shelf outlines instead of the visible coast. Further, the rock types match up on both sides of the Atlantic, and very accurate measurements of position have shown that the Americas are moving away from Europe and Africa.

8.8 Does life come only from life, or can it be created from inorganic origins in a test tube? Centuries ago people believed in life from spontaneous generation. After a number of experiments that showed life coming only from life, the scientific wisdom has been opposed to generation of life from inorganic ingredients. The question was related to whether there is a fundamental difference between organic (from life) and inorganic (mineral) matter. The German chemist Woehler used an inorganic start to synthesize urea – clearly an organic biochemical – and thereby showed that the supposed distinction was not real. All this leaves unanswered the questions of where and how life originated. Did it originate on earth? If so, was there a unique origin or were there multiple beginnings of life? Experimenters have tried to re-enact the origin of life in the early earth by making electrical discharges (sparks) in a medium that they believe resembles the earth's pre-biotic atmosphere. Some encouragement has come from the appearance of nitrogenous carbon compounds in the sludge that results. Such outcomes are still quite far from synthesizing life in a test-tube from inorganic ingredients. If life began somewhere other than on earth, then how did it arise there, and how did it get here?

8.9 Do species evolve, or do they keep their identity forever? This is the great question of direct creation vs. evolution, which has caused so much argumentation ever since Darwin. Scientists are convinced that the correct answer is some form of evolution; the details are still under debate, as in the example of gradualism vs. punctuated equilibrium. Did the various life forms arise through small modifications over very long times, or were there great and rapid changes? Many scientists believe that the fossil record fits best to a combination of the two ideas: long periods of little change punctuated by short periods of diversification.

8.10 In living animals, is there apoptosis (cell death in the brain) only, or is there neuronal generation (birth of new brain cells)? Until recently it was believed that all of the neurons in a human brain were formed before birth. After birth you lose unconnected neurons for about the first five years,

while the number of neuronal connections increases greatly. It has recently been shown that this is correct, but that new neurons are actually formed in small numbers throughout life, not just prenatally.

8.11 Is there room for purpose in science, or is randomness the only acceptable view? Although quantum mechanics and chaos theory both favor randomness, the concept of purpose, or teleology, need not be excluded. The success of global theories indicates that at least teleonomy can be accepted as a valuable concept. The question is still a metaphysical one.

8.12 The ultimate metaphysical question is whether beauty has a place in scientific judgment; Dirac and Chandrasekhar (1987) were two scientists in our time who answered with a resounding yes. Dirac went so far as to say that he preferred a beautiful theory with some minor disagreements with experiment to an ugly theory that provided a better fit to the data. In spite of the fact that a lot of scientists agree that beauty is important, they are hard pressed to define beauty in any useful way. How could we say that theory X is three times as beautiful as theory Y? Perhaps we should abandon or modify the metaphysical notion that the only useful ideas are quantitative!

I conclude by claiming that science knows a great deal. There is more to learn. There remain very interesting metaphysical propositions that need to be made scientific. There remain scientific statements, which could be proved false (or could be reinforced) if more and better experimental equipment were available. There is always a need for new ideas to be tested so that knowledge may increase. The calling of a scientist is still clear enough. Epistemology is not dead!

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